THE CULTURALLY ADAPTIVE FUNCTIONALITY OF SELF-REGULATION: EXPLORATIONS OF CHILDREN'S BEHAVIOURAL STRATEGIES AND MOTIVATIONAL ATTITUDES

PABLO ENRIQUE L. TORRES NÚÑEZ

QUEENS' COLLEGE

FACULTY OF EDUCATION

UNIVERSITY OF CAMBRIDGE

A dissertation submitted for the degree of
Doctor of Philosophy

October 2017

To Basilio Torres and Nora Núñez

"I am the gap between what I'd like to be

and what others have made of me … That's me. Period."

Fernando Pessoa

Declaration of originality

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text. It is not substantially the same as any that I have submitted, or, is being concurrently submitted for a degree or diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. I further state that no substantial part of my dissertation has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text.

Statement of length

This dissertation was 79968 words in length including headings, but not including appendices, footnotes, and references.

ACKNOWLEDGEMENTS

I would like to express my most sincere gratitude to many people who have supported my work on this thesis directly or indirectly throughout the past years. First, I would like to express my deepest appreciation to my supervisors, Dr David Whitebread and Dr Ros McLellan, for their constant insightful guidance and enthusiasm with regards to this work, but also for being a great source of personal and academic inspiration. Their combined intellectual perspectives have been and will continue to be an important part of the academic persona I am becoming. I would also like to offer my special thanks to Professor Neil Mercer, for his important empirical and theoretical guidance during the design of the study, and for the pub conversations and the music played together.

I am deeply indebted to all those who helped during this project and to those who were colleagues, and became friends. Thanks to Dr Daniela Jadue, Dr Matt Somerville, and Hanne Jensen for the many weeks we spent working together re-shaping the analytical tools used within this project, and whose generosity, companionship and friendship I profoundly treasure. Also many thanks to Dr Martina Kuvalja, Dr Chenyan Xu, Caitlin Ryburn, and Felipe Sandoval for gifting me with their valuable time to ensure the reliability of observational measures, and to Helen Lyttelton for her precise assistance with transcriptions of classroom discourse. *Gracias* to the amazing Elisa Calcagni and Felipe Figueroa for assisting me with crucial final technical details before submission. My gratitude to the talented Dr Alexandra Tzirkoti for helping me proof read a substantial part of this thesis. Special thanks also to my brother, Rodrigo Torres, for his statistical wisdom, support, and making England feel a bit closer to home. I would also like to express my greatest appreciation to Dr Jenny Gibson and Dr Elian Fink for allowing me to have a flexible working pattern while working at the PEDAL Centre, which was much needed to finish off this thesis.

I also received generous scholarships and research funding without which this project would not have been possible. My sincere thanks to CONICYT Chile (scholarship folio# 72130166), The University of Cambridge, The Centre of Latin American Studies and Queens' College for their financial support. I also owe a very important debt to all the participants of this study, the teachers and children in Chile and England. They not only provided the essential information to craft this thesis, but also inspired me enormously, with their passion for teaching and concern for children's wellbeing. It is them who remind me why it is worth doing what we educational researchers do, and why it needs to be done with the most wholehearted rigour. Thanks also to those academics who refreshed me with their kind support when I presented part of this work at different conferences and seminars; especially to Professor Nancy Perry, Dr Deborah Pino-Pasternak, and Dr Ruth Kershner for their kind appreciation of my work and encouragement. I

have greatly benefited also from the support of Dr Valeska Grau, Dr David Preiss, and Dr Christian Sebastián who have generously mentor me in all things related to academia in the last few years. I would also like to thank my PhD examiners, Prof. Jan Vermunt and Prof. Sanna Järvelä, for engaging with me in a very interesting discussion about this thesis and making the PhD Viva a rewarding and memorable experience.

And of course thank you to my family and friends. Thanks to Los Compadres for the joyful times we had playing music together, and to all my new and old friends who understood my isolation when the muddy waters of the PhD covered me. Special thanks to Rosa Vergara, Gabriela Núñez, and Daniela Jadue for coming to visit me in Cambridge and being there, always. Thanks to my English-Kiwi family, especially to Liz Ryburn for the huge amount of support, and to her together with Caitlin and Finlay for putting up with me when I always seemed tied to my computer; to Robin and Sue Wensley and family for making me part of their family too; and to Rene Horner for reminding me that there is a world of culture and arts out there. My heartfelt gratitude to my family in Chile – Ale, Adelmo, Rocío, Camilo, Joaquín, and Catalina – who I have missed so much and who have accompanied me with their warmth, understanding, and presence in the most important moments.

Finally, my most wholehearted thanks to my amazing wife Megan for helping me in so many ways and constantly being there for me. There are so many things I would need to thank you for, so many things that cannot fit within words, but let's just say that I am very lucky to have you by my side. Your company, our singing, and our intellectual discussions have been part of the most enjoyable instances of these years. I am completely indebted to you. And to my parents, Basilio and Nora, who have made me the person I am, and whose interest in others and love for big ideas breath throughout my life, and whom without knowing it, one way or another, have shaped much of this thesis.

ABSTRACT

The present study aimed to explore the culture specificity of student self-regulation and its supporting motivational attitudes. Specifically, it enquired about similarities and differences between Chilean and English 8 to 9 year-old students in terms of their expression of self-regulatory behaviours, the psychological factors underlying these behaviours, and the functionality of these behaviours for task performance. It also compared student adoption of achievement motivational attitudes as well as the functionality of these attitudes for investment of effort and self-regulatory activity between cultures. Finally, the role of classroom cultures for self-regulation was studied. In particular, it examined the effects of classrooms and the quality of teacher talk (teacher-to-student communicative interactions/demands), such as teacher 'regulatory talk' and 'socio-motivational talk', on student self-regulation.

A quantitative approach to the analysis of qualitative data (i.e. videos of student behaviour engaged in 11 to 13 experimental tasks, semi-structured interviews, videoed literacy lessons) was adopted. Eight classrooms situated in different schools from Chile and England were part of the study. In total, 8 teachers and 49 students – one teacher and six to seven students per classroom – took active part in the study. Qualitative data was primarily analysed using observational scales (for student behaviour), thematic analysis (for interview data), as well as socio-cultural discourse analysis (for videoed lessons). Statistical techniques, such as Mann Whitney U test, Factor Analysis, Multinomial logistic regressions, and Multilevel regressions were then applied on numerical transformations of the data.

Overall, results suggest that self-regulation and achievement motivational attitudes vary to important extents according to culture. Most interestingly, these varied between cultures not so much in terms of the degree to which children used or adopted them, but rather in terms of their functionality. Some key findings supporting this conclusion were: i) Strong similarities between English and Chilean children's levels of self-regulatory behaviours; ii) substantial differences across country samples in relation to the psychological factors underlying the expression of specific self-regulatory behaviours; iii) the finding of evaluative actions being self-regulatory in England but not in Chile; iv) a higher variety of self-regulatory behaviours being predictive of task performance in England than in Chile; v) the fact that learned self-regulatory behaviours accounted for effects of effective metacognitive control on task performance in England but not Chile; vi) some important differences in the achievement motivational attitudes expressed by Chilean and English students; and vii) culture-specific functionalities of various achievement motivational attitudes with respect to student effort and self-regulatory behaviours.

Moreover, results suggest that some aspects of children's self-regulation and motivational attitudes develop as tools to adapt to classroom cultures, specifically to the learning interactions/demands socially afforded by teacher talk. Among key findings supporting this

conclusion were: i) effects of classrooms on children's cognitive, social, and motivational self-regulation behavioural strategies, and ii) clear effects of teacher 'regulatory talk' (e.g., teacher 'self-regulatory talk' predicting more planning and asking for clarifications in students) and 'socio-motivational talk' (e.g., teacher 'talk against self-efficacy' predicting higher dependency-oriented help-seeking in students) on those behaviours with respect to which classrooms were found to matter. Thus a theory about the *culturally adaptive functionality* (CAF) of self-regulation and motivational attitudes supporting self-regulation is developed throughout the thesis.

TABLE OF CONTENTS

Acknowledgements iv

Abstract vi

List of figures and tables xv

INTRODUCTION 1

1.1. Cultural theories of human development 2

1.2. Educational contexts of the study 4

1.3. Thesis structure and main arguments 6

CHAPTER 2. LITERATURE REVIEW 9

2.1. Self-regulation and metacognition 9

2.2. Sociocultural perspectives: Links between culture and the development of thinking 11

2.2.1. Influences from pre-schooling 13

2.2.2. Influences from schooling 14

2.2.3. Metacognitive instruction 15

2.2.4. Teacher control and student autonomy 16

2.2.5. Social regulation of learning 18

2.2.6. Normed and not normed collaboration 21

2.3. Culture and self-regulated learning 24

2.4. Conclusions from the literature I 28

2.5. Motivation underlying self-regulation 28

2.5.1. Classroom motivational structures 30

2.5.2. Importance of goal structures and orientations over effort and self-regulation 31

2.6. Culture and achievement goal orientations 33

2.6.1. Achievement goals and effort across cultures 33

2.6.2. Achievement goals and self-regulation across cultures 36

2.6.3. Achievement goal orientations and help-seeking across cultures 39

2.7. Conclusions from the literature II 41

2.8. Research questions of the present study 41

CHAPTER 3. RESEARCH METHODOLOGY 44

3.1. Overview of the study 44

3.2. Research strategy 47

3.3. Sampling and participants 49

3.3.1. Sample overview 49

3.3.2. Country selection 50

3.3.3. School sampling 50

3.3.4. Classroom sampling 52
3.3.5. Student sampling 53
3.3.6. Final sample 55
3.4. Methods and data collection procedures 57
3.4.1. Pilot study 59
3.4.1.1. Conclusions derived from the pilot study 59
3.4.2. Final data collection methods and procedures 62
3.4.2.1. Methods and procedures for measuring children's self-regulation 62
3.4.2.2. Methods and procedures for the study of children's goal orientations 64
3.4.2.3. Methods for the study of classroom cultures 66
3.5. Research ethics 68
CHAPTER 4. DEVELOPMENT OF ANALYTICAL TOOLS AND DATA PREPARATION 71
4.1. Analytical tools: Development and application 71
4.1.1. Coding and categorising students' self-regulation 71
4.1.1.1. Applied observational scale 72
4.1.2. Analysis of students' achievement motivational attitudes through interviews 82
4.1.2.1. Interview conducted and nature of the data 82
4.1.2.2. Development of coding scheme 84
4.1.2.3. Analytical procedures for application of coding scheme to interviews 89
4.1.2.4. Examples of analysis 93
4.1.3. Analysis of teacher talk 94
4.1.3.1. Nature of the data 95
4.1.3.2. Coding schemes applied for analysis of teacher talk 96
4.2. Preparing the data for statistical analysis 103
4.2.1. Data sets and measurement units 103
4.2.2. Data aggregation 103
4.2.3. Addressing potential bias 104
CHAPTER 5. FINDINGS I. SELF-REGULATORY BEHAVIOURS AND THEIR RELATIONSHIP TO CULTURE 107
5.1. Descriptives of self-regulatory behaviours and task achievement 108
5.1.1. General characteristics and anomalies in the data 109
5.2. Results 110
5.2.1. RQ1. Do the self-regulatory behaviours and related levels of task achievement of 8 to 9 year-old Chilean and English students vary in extent across countries? If yes, how? 110
5.2.1.1. Summary 112
5.2.2. RQ2. Do the self-regulatory behaviours of Chilean and English 8 to 9 year-old students differ in the underlying self-regulatory factors (processes) they represent? If yes, how? 113
5.2.2.1. Factor analysis procedures 113
5.2.2.2. Factor solutions 114
5.2.2.3. Summary 118

5.2.3. RQ3. Do the same specific self-regulatory behaviours relate to levels of task achievement in both Chilean and English 8 to 9 year-old students? If not, which ones are most related to task achievement in each group? 119
5.2.3.1. Self-regulatory behaviours predicting final task accuracy across country samples 120
5.2.3.2. Summary 127
5.3. Conclusions 128
5.3.1. Research question 1 conclusion 128
5.3.2. Research question 2 conclusion 129
5.3.3. Research question 3 conclusion 129
CHAPTER 6. FINDINGS II. THE ROLE OF CULTURE IN MOTIVATIONAL ATTITUDES, AND THEIR FUNCTION IN EFFORT AND SELF-REGULATION 131
6.1. Descriptives of achievement motivational attitudes 133
6.1.1. Attitudinal 'orientations' descriptives 134
6.1.2. 'Achievement motives' descriptives 134
6.1.3. 'Goal oriented motives' descriptives 135
6.1.4. General characteristics and anomalies in the data 136
6.2. Results 138
6.2.1. RQ4. Are there any differences between Chilean and English 8 to 9 year-old students in the achievement motivational attitudes (goal orientations) they tend to adopt? If yes, how do they differ? 138
6.2.1.1. Differences in attitudinal 'orientations' across country samples 138
6.2.1.2. Differences in 'achievement motives' across country samples 139
6.2.1.3. Differences in 'goal oriented motives' across country samples 139
6.2.1.4. Summary 140
6.2.2. RQ5. Does the way that achievement motivational attitudes predict effort in Chilean and English 8 to 9 year-olds differ? If yes, how? 140
6.2.2.1. Selecting the most explanatory achievement motivational attitudes 142
6.2.2.2. 'Goal oriented motives' predicting effort across country samples 143
6.2.3. RQ6. How and to what extent does the motivational role that achievement motivational attitudes have for self-regulatory behaviours vary between Chilean and English 8 to 9 year-old students? 149
6.2.3.1. Effects of achievement motivational attitudes on self-regulatory behaviours in the Chilean sample 153
6.2.3.2. Effects of achievement motivational attitudes on self-regulatory behaviours in the English sample 157
6.2.4. Conclusions 172
6.2.5. Research question 4 conclusion 172
6.2.6. Research question 5 conclusion 173
6.2.7. Research question 6 conclusion 173
CHAPTER 7. FINDINGS III. CLASSROOM CULTURES AND STUDENT SELF-REGULATION: THE ROLE OF TEACHER TALK 176
7.1. Data information and descriptives 178

7.1.1. Preliminary note on the analysis carried out ... 181
7.2. Results ... 182
7.2.1. RQ7. What is the relevance of classrooms and the cognitive culture sustained within them by teachers through 'regulatory talk', for students' self-regulatory behaviours? ... 183
7.2.1.1. Importance of the classroom in students' self-regulatory behaviours 183
7.2.1.2. Importance of the classroom in students' self-regulation after considering parental education 185
7.2.1.3. Summary 187
7.2.1.4. Effects of teacher 'regulatory talk' on student self-regulatory behaviours in more challenging tasks 188
7.2.1.5. Summary 194
7.2.2. RQ8. What is the relevance of classroom motivational culture sustained by teachers through 'socio-motivational talk' for students' self-regulatory behaviours? ... 194
7.2.2.1. Effects of teacher 'socio-motivational talk' on student self-regulatory behaviour in more challenging tasks 197
7.2.2.2. Summary 199
7.3. Conclusions ... 199
7.3.1.1. Research question 7 conclusion 200
1.1.1.1. Research question 8 conclusion 201
CHAPTER 8. DISCUSSION ... 203
8.1. *Research Aim 1*: To understand the role that culture might have in self-regulatory behaviours in terms of levels and functions ... 204
8.1.1. Cultural differences in levels of self-regulatory behaviours (RQ.1) ... 204
8.1.2. Psychological factors underlying self-regulatory behaviours in each culture (RQ.2) ... 206
8.1.3. The predictive functionality of self-regulatory behaviours for task achievement across cultures (RQ.3) ... 209
8.2. Research Aim 2: To understand the role of culture in the levels and function of students' achievement motivational attitudes underlying self-regulation. ... 214
8.2.1. Cultural differences in adopted achievement motivational attitudes (RQ.4) ... 215
8.2.2. The predictive functionality of achievement motivational attitudes for effort across cultures (RQ.5) ... 217
8.2.3. The predictive functionality of achievement motivational attitudes for self-regulation across cultures (RQ.6) ... 220
8.3. Research Aim 3: To understand the importance of classroom cultures for students' self-regulation, and the specific effects of motivational and cognitive characteristics of teacher talk sustaining such cultures ... 226
8.3.1. The relevance of classrooms and teacher 'regulatory talk' for student self-regulation (RQ.7) ... 226
8.3.2. The relevance of teacher 'socio-motivational talk' for student self-regulation (RQ.8) ... 231
9. CONCLUSION ... 236
9.1. Limitations of the study ... 236

9.2. Contributions and implications of the study ... 238
9.2.1. Methodological contributions ... 238
9.2.2. Empirical contributions ... 240
9.2.3. Theoretical contributions ... 243
9.2.4. Implications of the study for research ... 244
9.2.5. Implications of the study for the promotion of children's self-regulation through educational practice and policy ... 245
BIBLIOGRAPHY ... 249
1 Appendix 1 – Cube assembly tasks ... 271
2 Appendix 2 – Informed consent letters and forms ... 272
2.1 Information sent to all parents of children from participating classrooms ... 273
2.2 Information sent to parents of children invited to be part of the full study ... 274
2.3 Consent forms filled in by parents of children participating of the full study ... 275
2.4 Information given to teachers participating of the study ... 276
2.5 Consent forms filled in by teachers participating of the full study ... 277
3 Appendix 3 - Original SBOS ... 278
4 Appendix 4 - SBOS II ... 283
5 Appendix 5 – Checking of statistical assumptions ... 295
5.1 Checking data distribution ... 295
5.1.1 Normality checks ... 295
5.1.1.1 Normality checks of self-regulatory behaviours (disaggregated version) 295
5.1.1.2 Normality checks of self-regulatory behaviours (aggregated version) 297
5.1.1.3 Normality checks of achievement motivational attitudes 299
5.1.2 Checking kurtosis and skewness of self-regulatory behaviours measures ... 302
5.2 Checking variance assumptions ... 302
5.2.1 Homogeneity of variance between samples (Levene's tests) ... 302
5.2.2.1 Levene´s test - Self-regulatory behaviours (disaggregate values) 303
5.2.2.3 Levene's test - Self-regulatory behaviours (aggregate values) 305
5.2.2.5 Levene's test - Achievement motivational attitudes 305
5.2.3 Multicollinearity checks ... 306
5.2.3.1 Correlation matrices of self-regulatory behaviours 306
5.2.3.2 Variance inflation factors (VIFs) and Tolerance values 308
5.4 Other regression assumptions ... 310
5.4.1 Checking independence of irrelevant alternatives (IIA) ... 310
5.4.2 Self-regulatory behaviours on final task accuracy ... 310
5.4.4 Goal oriented motives on effort ... 311
5.4.5 Goal oriented motives on awareness of errors ... 311

5.4.6 Goal oriented motives on planning during (order) 312
5.4.7 Goal oriented motives on asking for help 312
5.5 Checking of multilevel model assumptions 312
5.5.1 Homoscedasticity checks 312
5.5.1.1 Predictions of planning before 313
5.5.1.2 Predictions of asking for clarification 314
5.5.1.4 Predictions of asking for help 315
5.5.1.5 Predictions of maintaining motivation 315
5.5.2 Linearity checks 316
5.5.2.1 Predictions of planning before 316
5.5.2.2 Predictions of asking for clarifications 317
5.5.2.3 Predictions of asking for help 318
5.5.2.4 Predictions of maintaining motivation 318
6 Appendix 6 - Further Statistical Analyses 320
6.1 Confirmatory factor analyses 320
6.2 Multilevel regressions applying robust standard errors 323
6.3 Further analysis of goal oriented motives 327
6.3.1 Analyses of effortful learning avoidance goal oriented motives (English sample) 328
6.3.3 Analyses of performance approach goal oriented motives (English sample) 329
6.3.5 Analyses of performance approach goal oriented motives (Chilean sample) 332
6.3.6 Correlation matrix – Goal oriented motives (England) 334
6.3.8 Correlation matrix – Goal oriented motives (Chile) 335
7 Appendix 7. Pilot Study 336
7.1 School, classroom and lesson sampling 336
7.1.1 Tested sampling criteria 336
7.1.2 Considerations and conclusion about sampling criteria 337
7.2 Type of information obtained through the gathered data 338
7.2.1 Community cultural level 340
7.2.1.1 Social norms 341
7.2.1.2 Cultural values 343
7.2.1.3 Educational values 345
7.2.2 Interpersonal level 347
7.2.2.1 Classroom interaction 348
7.2.2.2 Classroom motivational structure 353
7.2.2.3 Activity settings 355
7.2.3 Individual level of analysis 357
7.2.3.1 Students' espoused motivational beliefs 356
7.2.3.2 Teachers' personal beliefs 358
7.2.3.3 Students' SRL 359
7.3 Conclusions from the pilot study 360

8. Appendix 8 – Supporting materials for codification of children'.....362

LIST OF FIGURES AND TABLES

Figures

Figure 3.1 Overview of the study 45
Figure 3.2 Model of the study - Researched variables and social levels of interest 47
Figure 3.3 Sampled English and Chilean schools socio-economic level (according to percentile of free school meals and vulnerability index) in relation to other schools of same country (higher percentiles indicate higher vulnerability). 52
Figure 3.4. Stages of data collection 62
Figure 3.5 Examples of target models built by participants (different difficulty levels) 63
Figure 4.1 Interview questions examining students' achievement motivational attitudes 83
Figure 4.2 Examples of descriptive coding about demonstration of ability 84
Figure 4.3 Summary of interpretative codes for attitudes towards effortful activity 85
Figure 4.4 Summary of interpretative codes for attitudes towards performance 86
Figure 4.5 Description of attitude themes found in the data 87
Figure 4.6 Description of motive themes found in the data 88
Figure 4.7 Teachers' 'regulatory talk' coding scheme 98
Figure 5.1 Summary of relationships explored between country culture and self-regulation 107
Figure 6.1 Summary of relationships explored between country culture, motivational attitudes, and self-regulation 131
Figure 7.1 Summary of relationships explored between classroom culture and self-regulation 176
Figure 7.2 Multilevel analysis model – Classroom teacher talk and student self-regulation 182

Tables

Table 3.1 Characteristics of sampled students per country 55
Table 3.2 Characteristics of participating teachers 56
Table 3.3 Research questions and the type of data and analytical techniques used to answer them 58
Table 4.1 SBOS subscales applied and adapted 73
Table 4.2 Self-regulatory Behaviour Observation Scale (SBOS) II - summary 77
Table 4.3 Measures of students' performance in the cube assembly task 79
Table 4.4 Coding scheme for analysis of students' 'achievement motivational attitudes' 91
Table 4.5 Examples of achievement motivational attitudes 94
Table 4.7 Teachers' 'socio-motivational talk' coding scheme 101
Table 5.1 Summary of descriptives of self-regulatory behaviours: Chilean and English students 109
Table 5.2 Descriptives task achievement and challenge: Chilean and English students 109
Table 5.3 Mann-Whitney U test - Differences between Chilean and English samples in self-regulatory behaviours 111
Table 5.4 Descriptives of significantly different self-regulatory behaviours across Chilean and English students 111
Table 5.5 Mann-Whitney U test - Differences between countries in task performance and challenge 112
Table 5.6 Descriptives task achievement and challenge: Chilean and English students 112
Table 5.7 Factor model goodness of fit according to number of extracted factors: Chilean and English samples 114
Table 5.8 Factor matrix, rotated - English students (loadings >0.4 displayed) 115
Table 5.9 Factor matrix, rotated - Chilean students (loadings >0.4 displayed) 115
Table 5.10 Multinomial regression - Predictive role of self-regulatory behaviours on final task accuracy. Chile. 123

Table 5.11 Multinomial regression - Predictive role of self-regulatory behaviours on final task accuracy. England. 124
Table 5.12 Summary of self-regulatory behaviours predicting final task accuracy in Chile and England 125
Table 5.13 Relevant self-regulatory behaviours, associated self-regulation factors, and their relation to final task accuracy across county samples..... 126
Table 6.1 Descriptives - attitudinal 'orientations' in Chilean and English participants 134
Table 6.2 Descriptives - 'achievement motives' in Chilean and English participants..... 134
Table 6.3 Descriptives - Goal orientated motives expressed by Chilean and English participants 135
Table 6.4 Suitability of 'goal oriented motives' for further analyses at country level 137
Table 6.5 Mann-Whitney U test – Differences in attitudinal 'orientations' between Chilean and English participants..... 139
Table 6.6 Mann-Whitney U test – Differences in 'achievement motives' between Chilean and English participants..... 139
Table 6.7 Mann-Whitney U test - Differences in 'goal oriented motives' between Chilean and English participants (prevalent 'goal oriented motives' only)..... 140
Table 6.8 Proportion of variance (pseudo R squares) of Effort explained by 'Orientations' and 'Achievement motives' v. 'Goal oriented motives'; Chile and England 142
Table 6.9 Equivalences between goal oriented motives expressed by students and motivational constructs found within the literature 143
Table 6.10 'Goal oriented motives' and their predictive power over effort. Chile. 144
Table 6.11 'Goal oriented motives' and their predictive power over effort. England. 146
Table 6.12 Summary of main effects of 'goal oriented motives' over effort. Chile and England. 147
Table 6.13 Comparison of 'goal oriented motives' predicting effort in Chilean and English participants 148
Table 6.14 Proportion of variance (pseudo R squares) of Self-regulatory behaviours explained by 'Orientations' and 'Achievement motives' v. 'Goal oriented motives'; Chile and England 150
Table 6.15 Proportion of variance (pseudo R squares) of Awareness of errors and 'Asking for help' explained by 'Orientations' and 'Achievement motives' v. 'Goal oriented motives'; Overall sample 150
Table 6.16 Frequencies of observed levels of self-regulatory behaviours per country 152
Table 6.17 Multinomial regression - Effects of 'goal oriented motives' on planning during (order) in Chile 154
Table 6.18 Multinomial regression - Effects of 'goal oriented motives' on awareness of errors in Chile 155
Table 6.19 Multinomial regression - Effects of 'orientations' and 'achievement motives' on asking for help in Chile..... 156
Table 6.20 Summary of predictive effects of achievement motivational attitudes over self-regulatory behaviours in Chile . 157
Table 6.21 Multinomial regression - Effects of 'goal oriented motives' on planning during (order) in England 159
Table 6.22 Multinomial regression - Effects of 'goal oriented motives' on awareness of errors in England..... 161
Table 6.23 Multinomial regression - Effects of 'orientations' and 'achievement motives' on asking for help in England 163
Table 6.24 Summary of predictive effects of achievement motivational attitudes over self-regulatory behaviours in England 166
Table 6.25 Summary of main effects of 'goal oriented motives' over planning during (order). Chile and England. 168
Table 6.26 Summary of main effects of 'goal oriented motives' over awareness of errors. Chile and England. 169
Table 6.27 Summary of main effects of 'orientations' and 'achievement motives' over asking for help. Chile and England. . 170
Table 6.28 Comparison of achievement motivational attitudes predicting planning during (order), awareness of errors, and asking for help in Chile and England 170
Table 6.29 Comparison of the function of achievement goal orientations (social and academic), represented by studied 'goal oriented motives', over planning during (order) and awareness of errors across Chile and England. 171
Table 7.1 Summary of descriptives of self-regulatory behaviours across participating classrooms 179
Table 7.2 Summary of descriptives of task achievement and challenge across participating classrooms 179
Table 7.3 Percentage of teacher 'regulatory talk' across participating classrooms..... 180

Table 7.4 Percentage of teacher 'regulatory talk' per country sample *180*
Table 7.5 Percentage of 'socio-motivational talk' over total of teachers' speech turns across participating classrooms *181*
Table 7.6 Percentage of teacher 'socio-motivational talk' over total of speech turns per country sample *181*
Table 7.7 Two explored task conditions *183*
Table 7.8 Variance of self-regulatory behaviours explained by classrooms *184*
Table 7.9 Multilevel analysis. Importance of classrooms for self-regulation (using ML method). *185*
Table 7.10 Importance of classrooms in student self-regulation after controlling for parental education (more challenging tasks condition) *186*
Table 7.11 Summary of importance of classrooms in student self-regulation before and after controlling for parental education (more challenging tasks condition) *187*
Table 7.12 Multilevel regression analysis - Effects of teacher 'regulatory talk' and country on student self-regulatory behaviours *191*
Table 7.13 Multilevel regression analysis – Effects of teachers' 'socio-motivational talk' on students' self-regulatory behaviours (more challenging tasks only) *198*
Table 8.1 Equivalences between goal oriented motives expressed by students and motivational constructs found within the literature *215*
Table 8.2 Goal oriented motives predicting planning during (order) *220*
Table 8.3 Goal oriented motives predicting awareness of errors *221*
Table 8.4 Goal oriented motives predicting asking for help *221*

1. INTRODUCTION

> *"I have slowly become aware of how much of what we do in schools and what we believe about teaching and learning is a matter of cultural routines and myths."*
>
> Graham Nuthall, 2005 (p.896)

Throughout this dissertation I share the journey I took through classrooms, with teachers and children, from Chile and England to try to understand the way in which cultures of education might exert (if at all) their influence on children's self-regulation development. Therefore, in a way, this thesis could be said to represent a theory building effort to improve our understanding of the relationship between culture and learning, which Graham Nuthall highlights above. The study was inspired by my personal experience as a student and education consultant in Chile and as a teacher assistant in New Zealand and English primary schools. In these experiences I noticed large cultural differences between classrooms. These differences seemed so big to me that ever since these cultural wanderings I have found it difficult to talk about 'education' rather than 'cultures of education'. New Zealand and English primary classrooms strike me as being designed to enjoy learning; a feeling, I am afraid to say, I have hardly sensed in Chilean classrooms. But most importantly for this thesis, I noticed that in New Zealand, and to a certain extent in England, children seemed to be empowered learners. They searched and used strategies that allowed them to succeed in their learning efforts. This contrasted strongly with my experience of Chilean classrooms where children 'listening' and 'complying' are considered to be good signs of learning, and where strategies for learning are not generally part of the picture. My initial observations of what teachers did in each culture of education (e.g., teaching strategies to children in NZ or England; being quiet and following teacher's directions in Chile) led me to think that much of what I was observing in children was the product of teaching. But I had no hard evidence to back up my hypothesis. Clearly, self-regulation was a big part of the approach to the teaching and learning I observed in New Zealand and England, and so it became the focus of my academic quest. A quest which has begun with the work I report in this thesis. Fortunately, this focus is not completely new. Previous research has looked at the relationship between culture and human development, to produce theories without which this thesis would not have been nearly as productive as it was. So before fully engaging with the particulars of this study, some of the theoretical ideas developed by these lines of research which inspired and provided the foundations of this study are introduced.

1.1. Cultural theories of human development

Theorists have described different links between culture and individual development. Indeed, some have even claimed that most people end up developing, adopting or internalizing ways of behaving and thinking that are coherent with their cultural contexts (Kitayama, 2002; Markus and Kitayama, 1991; Schwartz, 2011). But despite previous theorizations and research, there is still no clarity on what are the specific elements of each culture which could be considered key for the development of self-regulation and how these elements might exert their influence. There are, however, important theoretical perspectives that can guide enquiries like this one, attempting to shed light on such an issue.

For example, McInerney (2011) and Oyserman (2007) have theorized that the values held in different cultures and the type of actions that are considered to be desirable within a culture (expressed through social rules) set the parameters to which its members need to comply or self-regulate towards. While some theorists consider cultural values as the core of a culture (Smith and Schwartz, 1997), other theorists have pointed out that what might be the most important feature of culture for individuals' thinking are the affordances which, in consistency with such values, people are exposed to by institutions. Kitayama (2002), for instance, suggests that among these affordances are collective behavioural patterns and artefacts, including daily practices and routines, material and symbolic tools, and organizational systems. These behavioural patterns and artefacts have been said to be the externalization of culture (Kitayama, 2002), as well as the mediational means of psychological functioning (Wertsch, 2007). So the elements of culture that might be relevant for people's psychological development are likely to be those conceivable to be both inside and outside people's mind at the same time (Cole, 1996). This is a perspective that differs fundamentally from those seeing culture only as external to the individual and who therefore emphasize the adoption of values and advances in development as products of adaptations of individuals to cultural environments only (Inglehart and Welzel, 2005; Piaget, 1970).

The conceptualization of culture proposed by Kitayama (2002) mirrors very closely Vygotsky's (2012) conceptualization of the importance of the social plane (albeit not specific cultures) in the development of higher mental processes with which self-regulation could be identified. Vygotsky (1978) claimed that any psychological process appears twice, first as an external process at the interpersonal level and then as an internal process at the intrapersonal level.[1] Following Vygotsky, various scholars have expanded our understanding of how social context influences psychological functioning by adding elements of culture to the equation. For example,

[1] Please note this does not mean that external processes are integrally internalized by the individual, but rather that they are appropriated in forms that are transformed by the person in the process of internalization.

Wertsch (2007) and Cole (1996) have suggested we internalize forms of mediations that are provided by particular cultural, historical and institutional forces. So our mental functioning develops through the use of such mediators. Moreover, culture has been said to give meaning, or sense, to individual action in any particular social system (Kozulin, 1998). So not only are we likely to internalize forms of mediation but also the cultural meanings associated with the actions involved in these forms of mediation.

Contemporary to the work of Vygotsky was that of Leont'ev who gave more relevance to the societal surroundings in people's development. For example, Leont'ev (1978) emphasized the importance of collective forces in defining the motives of individual activity, which could not be understood outside the societal activity systems (e.g., schooling) that give meaning to them. A particularly appropriate perspective for a cultural enquiry, and one which encapsulates most of the theoretical perspectives just mentioned, is that of "cultural-historical activity theory" (CHAT) (Cole, 1996). This perspective expands a Vygotskian conception of culture understood as solely forms of social mediation to a conceptualization of it as forms of social mediation embedded in wider contexts of meanings and practices (Cole and Gajdamaschko, 2007). This theory establishes that thinking and motivation are constrained and generated in relation to the cultural activity system in which they are situated (e.g., learning within schooling and cultures of education) or, in other words, against the back drop of cultural meanings, values and practices surrounding a person.

Finally, some work has been done to try to understand the specific links between cultures of education and human development. For example, Barbara Rogoff (2003) points out that learning environments are imbued with educational values, or beliefs about what reflects good and bad learning and teaching within a society, a school and a classroom community. So the teacher-student apprenticeship relationship leads to children's appropriation of modes of action, routines and tools that are valued by the specific socio-cultural milieu where such educational relationship is situated (Kitayama, 2002; Rogoff, 1990). Furthermore, modern societies build their educational systems on a set of assumptions regarding appropriate stages of human development (Serpell and Hatano, 1997), which become the definitions and goals of 'development' (Göncü, 1999) likely to afford the teacher-student relationship to which Rogoff (1990) refers. In other words, institutions transform these assumptions, definitions, and goals into schools' values which then become social conditions of learning in classrooms through the promotion of practices and the regulation of assessments (Fleer & Hedegaard, 2010; Rogoff, 2003).

Therefore, considering the extant theory, cultural tools that can be identified as being both external and internal to the individual (such as values, meanings, procedures, and symbolic tools) may have quite an important role in the development of self-regulation. This might especially be the case given that self-regulation could be understood as a particular mode of

action which is both external (behavioural) and internal (mental) to the individual. Indeed, for example, previous studies show how "self-regulatory skills are acquired through social modelling, social guidance and feedback, and social collaboration" (McInerney, 2011, p.443). So, the extent to which the values of a particular culture might afford these types of social interactions and practices, and the meaning that it gives to them, may have important consequences for the development of self-regulation. Notwithstanding the relevance that cultures of education could have for self-regulation, the relation between the two has seldom been studied. This study, therefore, aims to begin to bridge this gap through an in depth analysis and comparison of Chilean and English students in relation to their self-regulation and educational contexts. These two countries could be said to have rather different cultures of education and therefore, are considered to be ideal for the task at hand. To ensure the reader has knowledge of the cultures of education explored in this study from the outset, before introducing the arguments developed throughout the thesis, the observations that other researchers have made about the Chilean and English classrooms are briefly noted.

1.2. Educational contexts of the study

Chilean and English classrooms have followed different schooling traditions. Chilean schools are historically based on French and American models (Campbell, 1959). The English system, on the other hand, has been claimed to follow its own tradition (Alexander, 2000). Although both systems have undergone many reforms through the years, they seem to still resemble the influences of Continental Europe's rationalism and British empiricism, which have divided the French and English intellectual orientations for centuries and could still be found in the specific values and practices within contemporary schools (Magnuson, 1984; Planel, 1997). These traditions differ in the value they give to the role of experience in knowledge acquisition, with rationalists claiming that knowledge can be attained independent from experience, and empiricists considering experience the ultimate source of knowledge (Markie, 2017). These traditions, for example, translate into more text based verus more experience based learning of the topics at hand (Magnuson, 1984), as well as less and more autonomy for learning (Planel, 1997), respectively.

As the literature points out, Chilean primary and middle school classrooms (primer y segundo ciclo) are heavily teacher centered. Within them, teachers tend to focus their discourse on the transmission of content and the instruction of ways in which things should be done (Martinic, Vergara, & Huepe, 2013). In Chile, teacher-student interactions are characterized by closed questions, low metacognitive follow-up questions, and little promotion of deep and creative thinking (Preiss, 2009; Radovic & Preiss, 2010). Half of the teachers' questions focus on maintaining the flow of lessons rather than promoting students' learning (Radovic & Preiss,

2010). And even when Chilean teachers try to develop specific skills in students, their questions probe simple information or just take an evaluative function (Preiss, 2009). Furthermore, students' contributions are scarce, centre on repeating or approving what the teachers say (Martinic et al., 2013), and are almost always called for by the teacher; with some studies finding that only 1% of students' contributions comprise spontaneous student questions (Radovic & Preiss, 2010). Moreover, even in the uncommon cases in which teachers show elements of teaching leading to the development of students' skills and understanding (e.g., with questions eliciting metacognitive skills or reasoning), Chilean teachers do not usually pursue students' contribution further (Preiss, 2009). Chilean teacher centeredness is also apparent when looking at the way in which time is used in Chilean primary lessons, with 19% of time spent in teacher monologues (Preiss, 2009) and only 14% in student talk for learning (Martinic et al., 2013).

In the case of English primary classrooms Galton, Hargreaves, Comber, Wall, and Pell (1999) in the ORACLE study found that primary classrooms had changed during the 1980's and 1990's from being focused on teacher-student individual interactions to teacher-student whole class interactions. This type of interaction has been labelled as "interactive whole class teaching" (or interactive teaching), and was promoted as the expected and inspected type of primary school classroom interaction by education authorities following the introduction of the English National Literacy and Numeracy Strategy (NS) in 1997 (Alexander, 2000). The NS has been regarded as representing one of the strongest changes in pedagogical practice in English history (Moyles, 2003). Interactive teaching involves posing many questions to students at the level of the whole classroom as well as engaging them in active learning by including , among others, 'get up and go' or 'show me' activities where children show and explain their ideas or learning products to teachers and classmates.

Additionally, the findings reported by Hargreaves, Pell, and Merry (2003) of classrooms participating in the SPRINT project around the year 2000 suggest that 28.6% of observations of teacher talk represented teacher questions, as opposed to 16.2% pre-NS. Furthermore, and in clear contrast to Chilean classrooms, over 70% of these questions prompted students' higher-order thinking by demanding explanations, reasoning, or answers to open-ended queries, with only 24% of them focusing on recalling facts, and 4% representing questions asked to supervise classroom tasks and routines. Moreover, the cognitive nature of teacher statements found in the SPRINT project were similar to those of questions. While only 10% of statements were about facts, 20% posed problems, and 26% provided feedback to students' about their learning activity. A certain level of teacher centeredness of English classrooms was evidenced, however, in the 32% of teacher statements reported as focused on instructing students about how to proceed in different tasks. But this percentage possibly also includes the occasions in which teachers taught students strategies for learning or conduct specific tasks.

Moreover, as Kelly, Dorf, Pratt, and Hohmann (2014) remark, English classrooms focus on improvement of children's skills, with clear setting of objectives, targeting both general and individualized small improvements, and continuous feedback on student practice. Other researchers have characterized a typical primary school lesson as a sequence of public-private-public phases of teacher-student talk, with the middle phase focusing on students carrying out a learning activity and the teacher providing private individual or group feedback for learning (Wilson, Andrew, & Below, 2006). Autonomy for learning is promoted here relatively more than in other Central European contexts (Alexander, 2000; Planel, 1997) which (similar to the Chilean context) value more convergence between students in relation to a normative standard (Alexander, 2000).

Overall, when comparing the Chilean and English cultures of education through their classrooms it is clear that the two contexts differ in many aspects. While Chilean classrooms are more centered on the transmission of content knowledge, memorization of facts, engaging children heavily in textbook work, emphasizing teacher direction, and ensuring the pace of learning is equal for all, English classrooms are more centered on the development of skills, promoting high-order thinking, relying on hands on activities, and tailoring the pace of learning to individual learning goals of improvement. So clearly, apart from representing the broader cultural values of collectivism and individualism (Hofstede, 2017), these two cultures of education could be said to demonstrate different educational values (e.g. autonomy v. compliance), different practices (e.g., textbook activities v. hands on activities), and even give different meanings to what is considered to be learning (memorizing content knowledge v. developing skills and higher-order thinking). All aspects which, as indicated by theories presented above, can be considered to be relevant for the influence that culture could have on human development, and which therefore makes these two contexts ideal to explore the ways in which cultures of education might influence children's self-regulation and its related factors.

1.3. Thesis structure and main arguments

This thesis is divided into nine chapters. Chapter 2 includes a literature review about relevant previous studies; Chapters 3 and 4 contain the specific methodology of the study and present the analytical tools developed and applied in the study; Chapters 5 to 7 report the empirical findings of the study; Chapter 8 contains a discussion of the key findings of the study; and Chapter 9 concludes the study by explicating the limitations and main contributions of the study as well as indicating possible future directions. The main arguments made in each of these chapters are presented as follows:

By reviewing previous empirical findings, **Chapter 2** starts building a theory suggesting that the ways motivational attitudes relate to self-regulation and how self-regulation is expressed in

each culture unfold in forms that fulfil *culturally adaptive functionalities*. Consequently, in light of previous research, it sets the specific research questions aimed to explore such a theory.

Chapter 3 develops an argument for a methodology which could be best suited to carry out a comparative study of self-regulation between two cultures of education, children and teachers (variables which have not been compared before). The chapter argues that in order to be able to access the culture-specific ways in which self-regulation might develop and ensure comparability between cultures, open-ended methods such as interviews and observational methods are more appropriate.

Chapter 4 presents the analytical tools and procedures developed and adopted to carry out the study. It makes evident the rationale of the specific analytical categories defined to analyse classrooms, children's interviews and self-regulatory behaviours in ways that were both culturally inclusive and allowed for subsequent statistical comparisons across country samples.

Chapter 5 reports the findings of the study in relation to children's self-regulatory behaviours. The results show that culture may have a clearer influence on the functions of self-regulatory behaviours than on their adoption. The chapter also shows that while there are certain universal core phases of self-regulation, the distinction between these phases, and the behaviours associated with implementing these phases, can have a cultural foundation.

Chapter 6 presents the results relating to achievement motivational attitudes thought to be relevant for self-regulation, and how their levels of adoption and functionality for levels of effort and self-regulatory behaviours vary according to culture. The results indicate that achievement motivational attitudes can even have opposite productive functions on self-regulation across cultures.

Chapter 7 contains the results of relationships explored between classrooms and naturally occurring teacher talk, on the one hand, and children's expression of self-regulatory behaviours, on the other. The results suggest that the aspects of self-regulation that vary most according to classrooms are its motivational strategies, and that the specific ways in which teacher talk could be influencing children's self-regulation might follow the logics of both social affordances of activity and internalization of inter-mental thinking processes theorized by previous research.

Chapter 8 discusses the results by connecting them to previous findings as well as to the theory about the *culturally adaptive functionality* of self-regulation and motivational attitudes underlying it. In particular, the chapter argues that i) the self-regulatory function and effectiveness of behaviours may be gained from cultural practices; ii) the productive functions that motivational attitudes have on self-regulatory behaviours may be gained from cultural values and cultural meanings given to practices; and iii) that while the cognitive aspects of classroom cultures (teacher talk centred on regulating children's thinking) might be a better explanatory dimension of the children's *levels* of self-regulation; iv) the motivational aspects of

classroom cultures (teacher talk centred on values and socio-emotional aspects of learning) may be a better explanatory dimension of the *qualitative forms* (specific behaviours) through which children express self-regulation.

Finally, **Chapter 9** concludes the thesis by pointing out the limitations of the study and making explicit the methodological, empirical and theoretical contributions of the study. It comes back to the argument about the *culturally adaptive functionality* of self-regulation. The chapter closes with suggested future empirical directions to keep exploring this theory and the ways in which the findings supporting it might be relevant for educational policy and practice.

2. LITERATURE REVIEW

This chapter presents a review of the literature suggesting the need to explore the extent to which children's self-regulation and achievement motivational attitudes might develop or be adopted in ways that are *functionally adaptive* to their schooling cultural contexts. For this purpose, the chapter is divided in 2 parts and 6 main sections. The first part of the chapter looks at self-regulation itself and includes a review of self-regulation and metacognition, sociocultural perspectives regarding the development of thinking, and links between culture and self-regulation. The second part of the chapter includes a review of the motivational attitudes underlying self-regulation and how social context, including culture, influences these attitudes. The chapter concludes by setting the research questions to be examined throughout the thesis.

2.1. Self-regulation and metacognition

Self-regulated learning has been shown to be highly connected to the enhancement of academic achievement (Zimmerman, 2011). It could be defined as an "active constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features in the environment" (Pintrich, 2000, p.453). Proactive self-regulators have been found to set learning goals, implement effective strategies, monitor and assess their progress towards their goals, establish productive environments for learning, and maintain a sense of self-efficacy (Zimmerman, 2011).

Research findings have proven metacognition to be a core element of students' capacity for self-regulated learning[2] (Whitebread and Pino Pasternak, 2010; Winne and Nesbit, 2009). John Flavell (1979), in a seminal work which brought metacognition to the fore, defined it as "knowledge and cognition about cognitive phenomena" (p.906). The term metacognition itself identifies a thinking process whereby the person involved in the thinking shifts positions from an automatic sort of thinking to a higher order one. In this higher order level, thinking itself starts to be the object of our thoughts (Larkin, 2010). This metacognitive capacity has been said to play an important role in varied forms of self-control and self-instruction (Flavell, 1979). Thinking metacognitively can lead us to acquire more efficient and quicker ways of learning, increasing the motivation and task behaviour at the same time as we develop new strategies to apply while learning (Larkin, 2010).

[2] Note that some researchers understand self-regulation as a part of the metacognitive components, equating it to its component of control (e.g., Schneider, 2010). Contrary to this, here, metacognition is understood as a part of self-regulation.

According to Whitebread and Pino-Pasternak, (2010), when brought together and summarized, the works of the two first key contributors to the generation of the field of metacognition – Flavell and Brown – could be considered to have arrived at a model of metacognition that included metacognitive knowledge, metacognitive experience and metacognitive control. According to this model, at a metacognitive level, we generate knowledge about our own cognitive processes, tasks and strategies. This knowledge helps us consciously reflect on our mental processes and therefore experience an awareness of their effectiveness towards the task at hand (thus monitoring them). These experiences of knowledge and conscious monitoring allow us to control/regulate our processes and strategies in order to ensure they are used appropriately for the purpose of each cognitive task or goal (Winne and Hadwin, 1998).

Different types of metacognitive knowledge are generated through metacognitive experiences. The literature has identified these metacognitive knowledges as *declarative* (what we can state about things), *procedural* (how to do things) or *conditional* (the when and why of things) (Kluwe, 1982 in Hacker, 1998; Larkin, 2010; Schneider, 2010). Procedural metacognitive knowledge has been proven to develop slowly throughout primary school years (Hacker, 1998). Children of 7 to 10 years of age, for instance, show a relatively good ability to monitor their level of progress while performing tasks (Schneider, 2010). Declarative metacognitive knowledge is also shown to develop steadily before adolescence. Schneider (2010), for example, has indicated that although 8 to 10 year-olds may not always be able to provide verbal justifications for the use of strategies, they do understand the relevance of using different strategies for different tasks. Moreover, the evidence suggests that children with higher levels of metacognitive knowledge, when entering school, demonstrate higher levels of metacognitive skill in problem solving during the first years of schooling (Annevirta & Vauras, 2006).

Self-regulation, therefore, might be understood as *applied metacognition*. An important model of self-regulation is that of Nelson and Narens (1990). This model, widely used in Psychological and Educational research today (Grau & Whitebread, 2012; Hacker, Keener, & Kircher, 2009; Minguela, Solé, & Pieschl, 2015; Robson, 2016; Whitebread & Pino-Pasternak, 2013), theorizes the interplay between psychological monitoring and control as a feedback loop between representational or meta-level cognition and the object level at which cognition itself is working. As such, cognitive strategies are thought to be carried out in order to progress in the task itself. *Monitoring* and *control* are metacognitive strategies applied to become aware (monitor) of the progress achieved in the task (through, for example, cognitive strategies) and then control behaviours and thoughts to change and adapt the activity as necessary (Hacker et al., 2009; Larkin, 2010). Deliberate changes carried out by students in order to achieve the understanding or product they are working towards are, therefore, always metacognitive activities (Winne & Hadwin, 1998). The monitoring and control model has been considered to be the base of a wide

variety of other models of self-regulated learning (e.g., Pintrich, 2004; Winne and Hadwin, 1998; Zimmerman, 2002) that have emerged to date (Massey, 2009).

Many different actions observed in children, youngsters or adults have been considered as indicative of metacognitive monitoring and control. Genuine self-regulatory actions generally vary according to the particular task in hand (Whitebread & Pino-Pasternak, 2013), but some examples of how different researchers have operationalized them can be illustrative. For example, among the actions considered to be indicative of metacognitive monitoring we find judgements of knowing or confidence in answers to questions when engaged in reading comprehension (Minguela et al., 2015; Nelson & Narens, 1990); pauses to check performance and noticing errors when engaged in solving a puzzle (Whitebread & Pino-Pasternak, 2013); or examining closely a solution process to decide next steps when assembling cube figures (Dermitzaki, Leondari, and Goudas, 2009). Among the actions considered to be indicative of metacognitive control we have, for example, planning (Kaplan, Lichtinger, & Margulis, 2011), online selection of strategies (Nelson & Narens, 1990; Robson, 2016); changing strategies or seeking help when facing difficulties in solving a puzzle (Whitebread & Pino-Pasternak, 2013); or prioritizing tasks according to the available time and task difficulty when recalling word pairs (Price, Hertzog, & Dunlosky, 2010).

This section presented a brief introduction to self-regulation and its relation to metacognition. The next section will offer a review of some sociocultural perspectives which have informed our current understanding of the importance of culture for the development of thinking and higher order psychological functions, such as self-regulation.

2.2. Sociocultural perspectives: Links between culture and the development of thinking

Many of those working within a sociocultural perspective attempting to understand the relevance of culture over psychological functioning is inspired in the early seminal works by Vygotsky, Luria and Leontev in Russia. According to these theorists, culture exerts its effect over psychological processes through social interaction and the mediation of cultural symbols, tools, and activities (Arievitch, 2008). In coherence with this, eminent contemporary psychologists, such as Bruner (1996) and Cole (1996), have pointed out that thinking always depends on the use of cultural resources such as artefacts and their associated meanings. Artefacts are perceivable human inventions which are simultaneously material and symbolic (psychological) in nature (Cole, 1996), with language probably being the most enabling of all (Bruner, 1996).

Similarly, Wertsch (1991), another prominent sociocultural psychologist, argues that communicative actions always reflect voices of the social, such as *social languages* (meanings)

and *speech genres* (communicative patterns or discourse). These are developed historically within particular cultures and institutions. Within the context of education, Wertsch refers to examples where teachers and students make use of social language such as when they make use of scientific conceptualizations or engage in speech genres. Conceptualizations are socially constructed abstract categories like 'clothes' and 'furniture', or more scientific concepts such as 'atmosphere'. Moreover, among the types of educational speech genres or communicative patterns mentioned by the author, are teacher-student interrogative patterns or student-student reciprocal teaching in relation to a particular reading (i.e. students asking each other 'teacher like' questions, summarizing, clarifying and predicting in relation to a particular reading).

Indeed, as evidenced in the reports of reciprocal teaching by Palincsar and Brown (1984), students improve dramatically in individual reading comprehension and learning behaviour following this type of pattern of communication. Following these results, Wertsch (1991) suggested that the social language and the speech genres in which students engage can be internalized or appropriated by them in order to then think individually. According to this proposition, therefore, children's development can not be understood as following a universal, linear trajectory. Development, rather, might be seen as following the particular ways afforded and required by the social languages and speech genres valued within each culture; those which enable people to participate competently in their own communities (Lave & Wenger, 1991).

Likewise, interactions between children and adults have also been understood, by other theorists, such as Barbara Rogoff (1990), to be an apprenticeship in the type of thinking valued by societies. This way, adults guide children in their appropriation of modes of action, routines and tools that are valuable for the specific sociocultural milieu where the relationship is situated (Kitayama, 2002; Rogoff, 1990). According to this understanding of cognitive development, "the purpose of thinking is to act effectively … with social and cultural definition of goals and means of handling problems" (Rogoff, 1990, p.6). Schools are structured in such a way that is instrumental to the handling of contemporary problems within their own societies (Bruner, 1996). Notions of intelligence and valuable thinking shape the type of activities, social interactions, and evaluations that can be observed within them (Rogoff, 2003). An important type of thinking developed within schools, for example, is the capacity to engage in scientific ways of thinking, or formal operational thinking (Piaget, 1970), considered to be achievable by schooled but not by non schooled individuals, when required (Rogoff, 2003).

A good way of identifying what a society considers as valuable thinking is found in the study of teacher discourse. Nystrand and colleagues (Nystrand, Wu, Gamoran, Zeiser, & Long, 2003), for example, found three modes of teacher-student discourses in whole classroom lessons reflecting such values. These were "*Recitation*, characterized by IRE patterns and teacher test questions; *Discussion*, characterized by the open-ended conversational exchanges of ideas largely absent of questions; [and] *Dialogic spell* …, characterized by engaged student questions and an absence of

teacher test questions" (Nystrand et al., 2003, p.150, emphasis added). Similar accounts can be found in the way that Alexander (2000) analyses classrooms across five different cultures. The author identified four types of classroom discourse: interrogatory (asking different kinds of questions), expository (transmitting and explaining ideas), evaluative (judging what is said or done), and dialogic (conversation overcoming power differences). In dialogic classrooms, children's voices are valued, they actively participate, as well as articulate, reflect and modify their own understandings/learning (Alexander, 2000), as a self-regulated learner would do. These different discourse modes might reflect different valued ways of thinking, such as those of developing students' creative, reflective or reproductive capacities for learning. They also reflect the cultural meanings given to what can be considered as knowledge and legitimate ways of getting to know the world (Bruner, 1996).

This section reviewed the relevant theories of the general importance of sociocultural contexts for the development of human thinking. The next section moves closer to the specific topic of the thesis by reviewing research evidencing the different sociocultural factors found to be relevant for self-regulation.

2.2.1. Influences from pre-schooling

The role played by preschool classrooms in the development of self-regulation, specifically executive functions, has been a subject of great focus in recent years. Although only a necessary not sufficient antecedent of metacognition (Bryce, Whitebread, & Szűcs, 2015), executive functions are high order cognitive processes underlying flexible goal-directed behaviours akin to self-regulatory behaviours, including working memory, inhibitory control, and attentional shift/control (Bernier, Carlson, & Whipple, 2010; Hofmann, Schmeichel, & Baddeley, 2012). Research focusing on preschool classrooms has found that the quality of teaching (Cadima, Verschueren, Leal, & Guedes, 2016; Fuhs, Farran, & Nesbitt, 2013; Raver et al., 2011) rather than the amount of preschool years (Skibbe, Connor, Morrison, & Jewkes, 2011) predicts higher levels of self-regulation in 3 to 5 year-olds. Cadima and colleagues (2016), for example, found that executive functions of 4 to 5 year-olds were positively predicted by relational closeness between teachers and students. They also found that instruction promoting higher order thinking skills and creativity incremented executive functions in students who initially demonstrated the lowest levels of executive functions. Similar positive results have been reported in a randomized control trial intervention aiming to help preschool teachers to improve their classroom management. Teachers' implementation of clearer rules and routines, higher rewarding of positive behaviour, and redirection of negative behaviour predicted higher levels of executive functions in students from low income families (Raver et al., 2011).

Another study conducted by Fuhs and colleagues (2013) looking more closely at teacher and student behaviour in the classroom showed important general effects of not only emotional but also instructional characteristics of teaching over all young children's executive functions, and not just in those lagging behind (cf. Cadima et al., 2016). Teachers and students were assessed in naturalistic conditions through 'observation sweeps' of 5 seconds each, during 60 occasions, over 3 days throughout a year and in a variety of subjects. The researchers found that communication of positive affect through enthusiastic/vibrant tone of voice and offering more approval than disapproval to students for their actions predicted higher levels of executive functions in 4 to 5 year-olds. Moreover, instructional quality that engaged students in more highly inferential thinking, and also engaged children for a longer period of time in learning activities were found to predict higher level of students' executive functions. Finally, the extent to which teachers orient young children in terms of the procedures and rationale of classroom activities (clarity of learning goals) has also been found to predict improvements in executive functions among 3 and 4 year-olds (Cameron & Morrison, 2011).

Following the research conducted on early years, the origins of self-regulation may be considered to be social. Research of children interactions with teachers show that both socio-emotional and cognitive elements are important for self-regulation development. Moreover, the nature of the particular communicative patterns that seemed to advance children's executive functions, self-direction, or self-regulation suggest that students' engagement in more abstract types of conversations is an important cognitive promoter of the foundations of self-regulation. The caring emotional tone of the interactions, however, might be as important for self-regulation development as this direct engagement in abstract thinking.

2.2.2. Influences from schooling

Similar to research on pre-schooling, in the past decade, school environments have started to be systematically incorporated in the research on the promotion and development of self-regulation (Perry and Rahim, 2011). Some of the aspects that can be identified as promoters of self-regulation in the classroom are *metacognitive instruction* (Ornstein, Grammer, & Coffman, 2010; Palincsar & Brown, 1984; Schneider, 2010; Waters & Kunnmann, 2010), *instructional control* (Ames, 1992; Perry, 1998; Perry et al., 2003; Patrick, Ryan and Kaplan, 2007; Stipek, Feiler, Daniels, and Sharon, 1995; Yin, Lee, and Zhang, 2009), *social regulation of learning* (Hadwin and Järvelä, 2011; Hadwin, Järvelä, and Miller, 2011; Järvenoja, Järvelä, and Malmberg, 2015), *normed and not normed collaboration* (C. H. Chen and Chiu, 2016; Dewey and Bento, 2009; Mercer and Littleton, 2007; Palincsar and Brown, 1984) and *classroom motivational structures* (Ames, 1992; Blay & Ireson, 2009; Gaeta, Teruel, Orejudo,, 2012; J.-I. Kim, Schallert, & Kim, 2010; Patrick, Ryan, & Kaplan, 2007; Perry, 1998; J. C. Turner et al., 2002). All of these, except for classroom motivational structures, are considered in the following sections.

Classroom motivational structures are examined in the second part of this review, where the motivational aspects found to underlie and drive self-regulation development are considered.

2.2.3. Metacognitive instruction

Today, researchers working on metacognitive skill development have come to the conclusion that age, although important, is not the primary factor affecting the extent to which primary school children are able to apply deliberate strategy use during their activities, but rather metacognitive instruction (Ornstein et al., 2010; Palincsar & Brown, 1984; Schneider, 2010; Waters & Kunnmann, 2010). Metacognitive instruction includes students learning to use metacognition and deliberate strategy use as part of their learning activities and teachers making strategy suggestions and metacognitive demands as part of their teaching discourse (Brown, Pressley, Van Meter, & Schuder, 1996; Ornstein et al., 2010).

For example, Ornstein et al. (2010) found that first grade students performed better at a memory task three years later, if their teachers adopted higher levels of what they called 'mnemonic' talk in the classroom. Mnemonic talk included teachers' suggestions of strategy use to students, or asking metacognitive questions (asking students to provide potential strategies and rationales for their use), while deliberately requesting information from memory. Another relevant study is that of Lin and Lehman (1999) on students' self-explanations. The authors found that any type of self-explanations leads to improvements in problem solving in tasks similar to those used during training. Nevertheless, only when students' self-explanations engaged in procedural and conditional metacognitive knowledge, such as explaining to themselves the when, how, and why of their own problem solving process, they tended to perform better in more complex and unrelated problems after the intervention. The researchers found that these particular students also engaged in more monitoring, revising and other metacognitive activities, as well as adopted more systematic strategies for problem solving than those adopting other types of self-explanations.

Teachers can also teach metacognitive skills and knowledge (not just suggesting strategies) directly to students. Studies looking at this type of teaching have found that the direct instruction of declarative and procedural metacognitive knowledge improves both achievement in maths and students' metacognition (Carr, 2010). An example of this type of instruction is that observed in the intervention by Desoete, Roeyers, and De Clercq (2003). The authors worked with over 200 third-grade students who were taught about algorithms in five different ways, for a total of five hours. Some of them were placed in a group that included metacognitive instruction while others were placed in groups considering the instruction of algorithms, general maths problems, a motivation group, and a control group. The metacognitive instruction group engaged in prediction of task difficulty, in estimation of accuracy of their answers

(evaluation) right after the task, and talked about problem solving procedures. The results indicate that six weeks later, the students of metacognitive instruction still had higher level of metacognitive skills, as well as performed better at algorithm problems.

Fuchs et al. (2003), in another quasi-experimental study, found similar results. In this study, a group of students was taught procedural metacognitive skills (goal setting and self-evaluation) and problem-solving transfer (talking to the class about how they transferred the problem solving structure to another domain within or outside school). Another group received instruction only for problem solving transfer, and no special content was taught in the control group. The group including the teaching of metacognitive skills demonstrated higher metacognitive procedural knowledge than any other group, in addition to being the only one demonstrating better performance in very different tasks from those used for the training.

The findings on metacognitive instruction resonate with the perspective of Kuhn (2000 cited in Waters and Kunnmann, 2010), who suggests that it is not the repetitive promotion of specific strategies (or mind tools) for specific tasks that develops metacognitive thinking, but rather the promotion of the metalevel itself. Despite the fact that the positive effects of metacognitive instruction for self-regulation are quite clear today (see Dignath, Buettner, Langfeldt, and Goethe, 2008 for a meta-analysis), it is important to consider that it is very rare to see teachers engaging in this type of instruction, unless explicitly invited to do so (Pressley, Wharton-McDonald, Mistretta-Hampston, & Echevarria, 1998). Perhaps due to its rarity in everyday classrooms, direct instruction on metacognition has been progressively abandoned within research endeavours, giving way instead to the study of everyday social and motivational characteristics in the classroom for students' self-regulation (Whitebread, Bingham, Grau, Pino-Pasternak, & Sangster, 2007). Notwithstanding, their findings provide a powerful lesson, namely that self-regulation is developed together with the *practice* of metacognition. As such, in line with a thesis on *cultural adaptive functionality* of self-regulation, one could hypothesize that self-regulation would develop to higher degrees in education cultures that engage students in metacognitive practice and to lower degrees in those which do so to a lesser extent. This is because self-regulation would be considered to be more adaptive where demanded the most. Moreover, as will be apparent in the next subsections, the importance of engaging students in metacognitive thinking has been integrated in different ways into the research of everyday classroom environments.

2.2.4. Teacher control and student autonomy

The level to which teachers control students' learning in detriment of their learning autonomy has been found to have negative effects on self-regulation. This is likely because, as Vermunt and Verloop (1999) suggest, within schooling, a high level of teacher control should be considered to

substitute not only students' motivational learning functions, but also cognitive and metacognitive ones. Less control exerted by the teacher hands the regulation of learning to students. This is generally done by either giving students greater responsibility to carry out their own learning, or by facilitating learning via regulation on a shared basis (Vermunt and Verloop, 1999). Some research has found that students produce higher levels of self-regulation even when they simply *perceive* themselves rather than their teachers as exerting control over their learning (Eshel & Kohavi, 2003). For example, when evaluation is perceived as an attempt to control rather than inform, metacognitive processes, which play a central part in self-regulated learning, are short-circuited (Grolnick & Ryan, 1987).

Children in teacher-centred classrooms have been found to be more teacher dependent (Stipek, Feiler, Daniels, & Milburn, 1995). Allowing more independence to students seems to enhance the latter's perception of control, which has also been considered as a significant factor affecting their engagement and quality of learning (Ames, 1992). In fact, students are more likely to place value on using effective learning strategies when teachers are seen as emphasizing independent thinking and improvement (Nolen & Haladyna, 1990). Unfortunately, as Hendy and Whitebread (2000) point out, even in the first years of school, children seem to view themselves as more dependent on adults than they were before.

Some typical instructional behaviours showing a controlling style are: setting outer sources of motivation, neglecting to explain the rationale of teaching decisions, relying on pressuring language (e.g., should, have to, and guilt inducing criticisms), displaying impatience for students to produce correct answers and reacting to students' negative expressions and complaints with authoritarian power assertions (Reeve, 2009). On the other hand, in order to make students feel supported in their autonomy and not controlled, three conditions need to be met: the adoption of students' perspectives, the welcoming of students' feelings, thoughts and behaviour, and the support of students' motivations and capacity for self-regulation (Reeve, 2009).

Furthermore, some studies on early childhood education have found that even the presence of teachers can have an impact on the level to which 3 to 5 year-olds engage in self-regulation within the classroom or during learning activities. Timmons, Pelletier, and Corter (2016), for example, found that kindergarten children engage in more self-regulation in the classroom when asked to carry out activities in small groups or when they are left to play, rather than when they are part of a whole classroom instruction. Similarly, Whitebread et al. (2007) found that within naturalistic classrooms, 3 to 5 year-olds engaged more in self-regulatory behaviours when left unsupervised and worked in pairs or small groups, rather than when they worked alone or in groups with the support of adults.

The results of research on instructional control seem to indicate that the more students are given autonomy or perceive themselves as being given autonomy when learning, the more they

are likely to engage in and practice self-regulatory behaviours. The productivity of autonomy for self-regulation is not, however, unconditional. As the work of Nancy Perry (2013) reminds us, only autonomy that is learning oriented is conducive to self-regulation. Therefore, autonomy must be instrumentally supported by the teacher in order to be productive. Such is the case, for example, when challenges are too big for students to tackle alone or the number of choices is too high for them to know which direction to follow. Research on teacher control and student autonomy seems to be aligned with the hypothesis proposed when reviewing metacognitive instruction, namely that self-regulation should develop to higher extents in students participating within cultures that allow the practice of metacognition, in this case, by affording (allowing and facilitating) children's learning autonomy in assisted ways. The way in which teachers could support such autonomous learning seems to be better covered in the literature on social regulation of learning.

2.2.5. Social regulation of learning

As Hadwin, Järvelä, and Miller (2011) suggest, self-regulatory processes can be developed from interactions that temporally mediate regulatory work. Therefore, as well as deliberate teaching of metacognitive strategies, learning interactions that engage students in social regulation of learning, such as co-regulation and socially shared regulation of learning, could be considered as promoting self-regulation development (Hadwin, Järvelä, and Miller, 2011). Co-regulation refers to cases where one regulates the activity of another person or a group (Malmberg, Järvelä, and Järvenoja, 2017;Perry and Winne, 2013; Turner and Fulmer, 2013; Vauras, Kinnunen, Kajamies, and Lehtinen, 2013; Whitebread and Pino-Pasternak, 2013). It may be considered to be similar to scaffolding (Hadwin et al., 2011), but including types of teacher support, such as modelling, which do not necessarily require to be contingent or fade progressively. Socially shared regulation, on the other hand, can be seen when people engage with other group members in an effort to regulate the joint activity of the group – production or knowledge building – and maintain symmetric/reciprocal power relations (Grau & Whitebread, 2012; Malmberg et al., 2017; Panadero, Kirschner, Järvelä, Malmberg, & Järvenoja, 2015; Volet, Vauras, & Salonen, 2009).

As Hadwin, Wozney, and Pontin (2005) suggest, the appropriation of self-regulation can be mediated from the other to the self by engaging in co-regulations between them. As these authors suggest, co-regulations such as teacher questioning students (focusing their thinking) and students asking questions to teachers (indirect ways of self-regulating thinking) mediated changes from higher teacher direction to higher student self-regulation over time. In general, however, proper teacher scaffolding, including a sequence of contingent teacher support, progressive withdrawal of support, and transferring of responsibility to students has rarely been observed in classrooms (van de Pol, Volman, and Beishuizen, 2011; van de Pol, Volman,

and Beishuizen, 2010, 2012), unlike other types of co-regulations such as modelling (Fidalgo, Torrance, Rijlaarsdam, van den Bergh, and Álvarez, 2015; Zimmerman and Kitsantas, 2002) and teacher support (Puntambekar & Hubscher, 2005; van den Boom, Paas, & van Merriënboer, 2007). This is not surprising, given the difficulty of following such a scaffolding sequence with 30 (more or less) students in parallel.

The learner's independent regulation of activity, however, might not be mastered if such a mediation does not progressively withdraw contingently as the learner becomes able to perform autonomously (J. D. Day & Cordón, 1993). As a consequence, high levels of teacher support that do not withdraw contingently might minimize the need and opportunity of students to practice and develop their own self-regulatory skills. Notwithstanding, specific scaffolding strategies that do not necessarily progressively fade but in which teachers simply 'lend' students their mental capacities in order to assist and shape their learning efforts have been found to be more common in classrooms (van de Pol et al., 2010). Scaffolding strategies require a combination of at least one scaffolding purpose and one scaffolding mean which, according to van de Pol et al. (2010), are generally studied by researchers (and therefore possibly applied by teachers) from a selected pool of five common *aims* and six common *means*. Commonly applied scaffolding aims can be categorized as metacognitive (direction maintenance), cognitive (aiding understanding and reducing degrees of freedom), and/or motivational (to encourage interest and manage frustration). On the other hand, the most common scaffolding means are feeding back, hinting, instructing, explaining, modelling and questioning.

The effectiveness of classroom scaffolding strategies can be seen in various studies, but only a few of them explore the effectiveness of whole-classroom instruction or interventions rather than one-to-one tutoring interactions (van de Pol et al., 2010). The studies of Hadwin et al. (2005), previously mentioned, and Mercer et al. (2004), belong to these exceptions. Mercer and colleagues (2004) found that teachers asking constructive questions, modelling problem solving skills, and promoting learning through small group discussions improved students' use of talk for reasoning, as well as non-verbal individual problem solving. Similarly, Azevedo et al. (2005) and Torras and Mayordomo (2011) found that when teachers used scaffolding strategies to guide self-regulated learning in ways that were adjusted to students' cognition, this led to higher learning than when students were given a fixed set of resources (i.e. a list of questions or a computer learning environment) specially designed to promote self-regulation. These studies show, therefore, the importance of teachers' use of scaffolding strategies even when they divide their attention among various students in the everyday classroom and cannot fade their support progressively or even ensure its contingency (as in the case of small group discussions and modelling).

Another important line of literature linking classroom social interactions with self-regulation is that of socially shared regulated learning (SSRL). SSRL "'involves interdependent or collectively

shared regulatory processes, beliefs, and knowledge (e.g., strategies, monitoring, evaluation, goal setting, motivation, metacognitive decision making) orchestrated in the service of a co-constructed or shared outcome" (Järvelä, 2015, p. 282; Panadero and Järvelä, 2015, p. 191). Within this line of research, self-regulatory processes are theorized and evidenced as either influenced, embedded, constructed, or mutually defined by social interactions, social meanings, and wider social contexts (e.g., cultures) (Hadwin and Järvelä, 2011). Generally, researchers have reported that self-regulation or metacognition triggers or predicts episodes of SSRL (Iiskala, Vauras, Lehtinen, & Salonen, 2011; Miyake & Kirschner, 2014; Panadero et al., 2015; Volet, Summers, & Thurman, 2009), or have theorized them as interdependent (Volet, et al., 2009), but it is difficult to find studies looking at how students' involvement in SSRL relates to their individual self-regulatory development.

A closely related line of research contained within SSRL is that of socially-shared metacognition (SSM), which focuses on the thinking, rather than the motivational aspect of SSRL (Panadero & Järvelä, 2015). Findings from these studies show that students tend to engage in shared metacognition while collaborating when tasks are difficult (Iiskala et al., 2011), and that their engagement makes them perceive such tasks as less difficult (Hurme, Merenluoto, & Järvelä, 2009). Also, when looking at the dynamics between task and shared metacognition, the few studies available to date have found that shared metacognition helps groups to stop advancing within the task in equivocal or unproductive ways (Iiskala et al., 2011; Iiskala, Volet, Lehtinen, & Vauras, 2015) and makes them focus on more cognitively deep aspects of the learning tasks (De Backer, Van Keer, & Valcke, 2015a, 2015b). The results suggest that sharing metacognition might possibly work as a scaffold of group performance/understanding and group members' sense of efficacy, but similar to those of SSRL they do not indicate either if such an engagement drives individual metacognitive or self-regulatory development.

Regardless of the directionality of the relationship between self-regulation and SSRL (or SMM), the key aspect of SSRL for self-regulation development might be that when students work together they are likely to engage in metacognitive thinking while making their thinking visible (Grau & Whitebread, 2012; Hurme et al., 2009; Malmberg et al., 2017). In order to fully engage in SSRL, students need to develop some level of shared understanding (Järvelä & Järvenoja, 2011) which requires them to listen and share perspectives to ultimately build on each other's ideas (Näykki, Järvenoja, Järvelä, & Kirschner, 2017). This is exactly the type of engagement promoting the *perspective taking* that Tomasello (1999) hypothesizes as the main driver of self-regulation development. Despite early seminal works (Wertsch, 1979) and other more recent efforts (Rogoff, 1990) demonstrating the importance of inter-subjectivity in joint problem solving for self-regulation development, evidence of the relationship between SSRL in classrooms and students' self-regulation development is still underdeveloped.

2.2.6. Normed and not normed collaboration

Very closely related to research on social regulation, research on collaboration, or more specifically, *normed collaboration,*[3] has been found to have important developmental links with self-regulation and improvement in individual problem solving. Normed collaboration can be understood as any type of collaboration for learning and/or joint production which is framed within clear rules of social interaction.

A good example of this type of research is that of Neil Mercer at the University of Cambridge. According to Mercer, student-student interaction can be characterized according to the type of talk that students used when working together. There are three main types of student-student talk identified by the author and his colleagues (Mercer & Littleton, 2007): *disputational*, *cumulative* and *exploratory*. The first is characterized by disagreement and low constructive criticism, the second by positive addition of uncritical ideas, and the third by joint constructive and critical building of ideas. Exploratory talk has been found to be teachable when ground rules for talking are added to the collaboration (Littleton & Mercer, 2013). This type of talk helps students to learn how to reason about others' and their own ideas. Its use has been linked to students solving problems more effectively collaboratively, but also, and most interestingly for this study, individually (Mercer, 2013; Mercer, Wegerif, and Dawes, 1999). Similar positive results of teaching students how to think together through exploratory talk have been found in studies in Mexico and Britain (Wegerif, Perez Linares, Rojas-Drummond, Mercer, & Velez, 2005). These results have been claimed to demonstrate how the communicative function of language can be appropriated by students to self-regulate their individual problem solving (Littleton & Mercer, 2013; Rojas-Drummond, Gómez, & Vélez, 2008).

Another type of normed collaboration can be found in the recent work by Chen and Chiu (2016). The authors looked at the effects of engaging fifth-grade students in scripted collaboration for problem solving on students' self-reported metacognitive planning and control. The scripting involved students explaining, questioning and feeding back to each other in phases in order to clarify the problem, gather information to solve it, and construct solutions. Students worked together as a group after each student had thought about each issue individually, and then shared with other groups their solutions, in order to receive feedback. Unlike researchers looking at exploratory talk, SSRL, or SSM, the authors did not look at the quality of the group communications; rather, through a quasi-experimental design, they found that students from the experimental classrooms self-reported higher levels of metacognitive control.

[3] Please note that the term 'normed collaboration' is not found in the literature. It has been used here only for purposes of simplification and conceptual clarity.

Furthermore, the largely acclaimed work by Palincsar and Brown (Palincsar & Brown, 1984; Palincsar, Brown, & Martin, 1987) on students' reciprocal teaching, previously mentioned as a type of classroom discourse according to Wertsch (1991), is a powerful example of normed collaboration. It could be considered to link both social regulation and metacognitive instruction with students' self-regulated learning. In students' reciprocal teaching, teachers model metacognitive thinking for reading comprehension; then, in groups, students question each other following the teachers' model. Finally, the student self-regulates his/her own text comprehension through the learned type of questions. Here, the internalization of metacognitive regulation is scaffolded from the intermental level of teacher-student interaction and student-student interaction to the intramental level of particular students' cognition. After a minimum of 25 days, students who used to achieve 30 per cent of text comprehension achieved 75 or 80 per cent on repeated occasions.

Other researchers have focused on linking not normed rather than normed collaboration to self-regulation. A good example is the work done in the ACTS programme reported by Dewey and Bento (2009). The programme included features of metacognitive instruction and collaboration and worked with 7 to 9 year-olds for a period of two years. During this time, teachers explicitly raised children's awareness of their own thinking for learning, in addition to using thinking groups to support children's co-construction of knowledge. The authors found positive effects of the intervention on aspects that could be thought to be self-regulatory. For example, following the intervention, teachers reported that students asked more questions, were more keen to self-evaluate their learning, approached tasks in a more structured way, and seemed more able to tackle different types of problems.

Another type of research that could shed light onto the metacognitive benefits of group work is that of Christine Howe (2010, 2013). Her research looks at cognitive change following group discussions. Although not directly linked to self-regulation, the results show that following group discussions in relation to a particular scientific problem, 8 to 12 year-olds generally struggle in arriving to agreed resolutions. Nevertheless, a close analysis of the collaborative process underlying these non-resolutions found that students showed a positive change in cognitive understandings when in their discussions there were more contradictory points expressed. Moreover, the highest gains in content understanding were found not when students arrived to the correct answer to a scientific problem, but rather when no agreement was reached, although attempted. As Howe (2013) theorizes, it is possible that these results could be explained by non-resolutions leaving metacognitive thinking processes open.

In general, similarly to Tomasello's (1999) point of view with respect to the developmental force of *perspective taking* over self-regulation development, research on collaboration suggests that metacognition, and subsequently self-regulation, may be enhanced when students engage in trying to understand each other's perspectives. More specifically, research on the relationship

between teacher-student or student-student interactions revisited in this section, indicates that the way in which teachers teach, support, or afford the emergence of metacognitive skills and knowledge, either directly or by promoting collaborative learning, has an impact on students' self-regulation. In various cases, this impact can be considered to be developmental. This is especially the case for those lines of research that have established relationships between the quality of social interactions and independent measures of students' self-regulation growth (or problem solving improvement, as a proxy). Among them, we find the influence of teacher scaffolding of students' thinking and problem solving, metacognitive instruction, and teacher control over self-regulation. We know less of the developmental effectiveness of co-regulation (i.e. supports that are not necessarily contingently withdrawn) and socially shared regulation (Hadwin et al., 2011), on self-regulation (Coltman, Warwick, Wilmott, Pino Pasternak, & Whitebread, 2013). Considering all other bodies of research, however, the effects of these ways of social regulation are likely to be positive. On the other hand, the effects of co-regulation that is controlling or directive rather than scaffolded, are likely to be negative, as research on teacher control in schools and preschools, previously reviewed, would suggest.

Moreover, the research reviewed within this section allows us to hypothesize, in line with the thesis of the *culturally adaptive functionality* of self-regulation development, that education cultures where teachers guide, rather than control students' thinking and engage students more in collaboration than in individual learning, would encourage higher levels of self-regulation. The literature reviewed so far, nonetheless, only allows us to think of the *culturally adaptive functionality* of self-regulation in terms of the degree to which particular cultural pedagogical tools could mediate the extent to which children develop this type of higher order thinking. In a sense, it argues in favour of a linear understanding of cognitive development. Within this understanding, self-regulation is thought of as developing to higher or lower degrees in order *to function* with the self-regulatory intensities afforded and needed for participating in one's education culture (be this national, institutional, or community level culture).

Another perspective, however, could perceive self-regulatory (and cognitive) development as taking multiple different paths. A more comprehensive examination of a thesis of the *culturally adaptive functionality* of self-regulation development, therefore, would require the study of how self-regulation might develop in *different forms*, such as different cognitive actions or observable activity, according to culture, and also how similar forms of self-regulation might have *different functionalities* for problem solving across cultures. The next section presents the findings of cross-cultural research in self-regulation and the ways in which these could inform a more integrated view of the *culturally adaptive functionality* of self-regulation development.

2.3. Culture and self-regulated learning

As mentioned in the introduction of this thesis, some researchers such as (Kitayama, 2002; Markus & Kitayama, 1991) and Schwartz (2011) think that most people end up developing, adopting or internalizing ways of behaving and thinking that are coherent with their cultural contexts. In line with more situative sociocultural approaches to cognitive development that mix psychological and anthropological perspectives (Lave, 1988; Lave & Wenger, 1991; Rogoff, 1990, 2003), it is reasonable to hypothesize that the specific ways in which self-regulation might develop could be strongly related to the specific practices afforded in the educational communities in which children participate. As Rogoff (1990) suggests:

> *guided participation may be widespread around the world, but with important variations in arrangements for and communication with children in different cultures. The most important differences have to do with the goals of development –what lessons are to be learned – and the means available for children either to observe and participate in culturally important activities or to receive information outside the context of skilled activity* (p. 110).

A relevant line of research looking at how self-regulation might vary across cultural context is that of Mary McCaslin. Her studies explore the way that personal, social and cultural influences might interact to influence adaptive learning – a similar construct to self-regulation defined as acting upon oneself and the situation to meet demands, needs and personal goals (McCaslin, 2009). The author adopts a situative perspective of learning (Lave & Wenger, 1991), equating co-regulation to joint and reciprocal influences from the social, cultural, and personal planes that challenge, shape and guide students' emergence of adaptive learning (McCaslin, 2009)[4].

In a recent study, McCaslin and Burross (2011) examined the instructional opportunities given to third to fifth-grade children, such as teachers' cognitive demands (basic fact/skill learning, elaboration of ideas, reasoning), teacher questioning (managerial, task, or thinking related), and absence/presence of teacher guidance. They then explored the level in which these opportunities correlated with how much the observed students were on task, seemed to be productive, and asked questions to teachers while in class, students' self-report of their own adapted-participation in learning through behaviours directed towards their own or others'

[4] The theory elaborated by McCaslin (2009) perceives social influences as both opportunities and interpersonal relationships that are practicable and influence how people cope with and adapt to their experiences. Similarly, cultural influences are considered to set the norms and challenges defining what is probable for people, as well as social and cultural institutions. The different influences enter into dynamics and tensions that afford participation and validation of a socially embedded and adapted self who, nevertheless, can also exert influences towards social and cultural planes. Therefore, from this perspective, self-regulation, or adaptive learning, is, in nature, co-regulated by personal and social influences (McCaslin & Burross, 2011).

learning (e.g., helping others, getting stuck, listening, getting distracted), and measures of achievement.

The results showed that when teachers tended to structure problem solving (a composite of engaging in asking managerial aspects of the task or procedures, as well as demanding reasoning from students), students tended to ask teachers more questions in class. Moreover, when teachers engaged in direct instruction (a composite that included focusing on basic facts/skills and asking right/wrong type of questions to students), students tended to self-report higher levels of listening and engage in their work, as well as show higher results in language, maths and reading national tests. The authors suggest that their results show how students adapt their learning to the ways demanded by their environments, tending to listen more in class if this was in line with teachers that use more direct instruction, or tending to ask more questions if this matched to teachers that engage them in more problem solving thinking.

This type of situated perspective has also been theorized and increasingly evidenced in relation to how people select different self-regulatory strategies according to specific purposes of learning tasks (see Kaplan, Lichtinger, and Gorodetsky, 2009; Kaplan, Lichtinger, and Margulis, 2011). Although not directly related to culture, their findings suggest that people do engage in different types of strategic behaviours according to their situations and personal context, such as their purposes for engaging in a particular task/learning, the perceived action possibilities they estimate, as well as personal learning identities or self-perceptions. Moreover, the researchers involved in this type of research suggest that even though purposes and engagement (including self-regulation strategies) change in dynamic ways in accordance with the achievement situation, they are also highly constructed within a cultural milieu.

In particular, Kaplan, Lichtinger, and Margulis (2011) suggest that self-regulation is affected by the sociocultural meanings of 'achievement', 'self', and 'engagement'. The authors offer exemplified evidence from essay writing. They suggest that when writing an essay, the writer has to think about the style and rules of writing they need to follow (achievement criteria), as well as the audience they are writing for (extension of the self), and how to generate an affective impact on the latter while remaining credible (purpose). In other words, as McCaslin (2009) states, "adaptive learning is enhanced by the CR [co-regulation] of responsive and contingent environments that demonstrate and validate the link between actions and outcomes" (p. 138).

As mentioned in the Introduction, given that self-regulated behaviour could be understood as a particular mode of action (both external and internal), culture may have an important role in its development. Different cultures appear to hold different values or demonstrate different degrees of desirability regarding the actions of their members, which are expressed through social rules to which its members might need to comply or self-regulate (McInerney, 2011; Oyserman, 2007). So, both the extent to which the values of a particular culture afford these

types of interactions and the meaning they give to them may have important consequences for the ways in which self-regulated learning develops. Despite the relevance that cultural contexts may have for self-regulation, the relation between self-regulation and cultures of education broader than classrooms has seldom been studied.

There are, however, some studies available that have at least established the importance of such a relationship. For example, in a study comparing self-reports of gifted students from China, Germany and the United States, self-regulatory strategy use was found to be predicted more strongly by country of origin than gender, or motivational beliefs such as achievement goal orientations, intrinsic value of the topic, or personal self-efficacy (Tang & Neber, 2008). Although not including observations of classrooms, the authors hypothesize that the differences might be due to pedagogical disparities, as Chinese classrooms (where students were found to have the lowest levels of self-regulation) stress the regulatory role of the teacher more than German or American classrooms. A similar result was found when studying students from grade nine to twelve from two different ethnic groups (situated in two different schools and localities) of Kenya. In this study, ethnicity was found to be a stronger predictor of self-regulation than age or gender (Ongowo & Hungi, 2014).

Moreover, despite the centrality of cultural values for cultural systems, more recent studies have found that even when students share similar national values, if they are taught in different ways, they develop different levels of self-regulation. This is the case of a study by Lau and Chen (2013) comparing self-regulation of students from mainland China and Hong Kong in the self-regulation of reading comprehension. The results showed that following an important language teaching reform starting more than one decade ago turning language teaching into a more dialogic process in mainland China, students from Beijing demonstrated higher levels of self-regulation than those from Hong Kong. In line with literature about social influences over self-regulation, reviewed above, these types of cross-cultural studies suggest that levels of self-regulation might vary according to education cultures more than cultures broadly defined. All these studies, however, have focused on high school students and used self-report measures of self-regulation. The understanding of how education cultures might influence primary school children's observable self-regulation seems to be pending exploration.

More in line with the situative perspectives of McClasin, Rogoff and Lave, other studies have made links between cultural educational values and self-regulation. For example, one study explored how the specific type of strategies students used when self-regulating their learning varies according to culture. Purdie and Hattie (1996) studied Japanese students in Japan and Australia and then compared them to Australian students in Australia. The authors found that strategies aimed to memorize and understand content varied according to the cultural background of the student. Although all groups of students used similar range of strategies – and indeed were found by the same researchers to demonstrate similar overall levels of self-

regulation (Purdie, Hattie, & Douglas, 1996) – Japanese students tended to use more memory based strategies to assist understanding in Japan, while Australian students used more meaning oriented strategies directly. Interestingly, the group of Japanese students living in Australia adopted a mix between the two types of strategies, suggesting an acculturation effect over the self-regulatory means to achieve similar goals.

The dynamics between social and motivational aspects underlying self-regulation might also vary according to cultural values. A study that included multicultural 7th and 8th grade classrooms in the US working with Mexican-, African- and White-American students, found that culture might have some degree of relevance on the social dynamics explaining levels of self-regulated learning (Hinnant-Crawford, Faison, and Chang, 2016). Specifically, the authors hypothesized a path model including relationships between students' perceptions of the benefits of help seeking, level of teacher support received, co-regulation among students, and self-regulation (all as self-reported), as well as their effect over maths achievement. When analysing simpler relationships between only two variables, the authors found cultural invariance on the positive effects of co-regulation and teacher support over self-regulation. The analysis of the whole model including their hypothesized way in which these variables would influence one another and then maths achievement was a good fit only for African-Americans. There was also cultural variability in the relationship between attitudes towards help seeking and students' self-regulation. The attitude predicted self-regulation in Mexican-Americans and African-Americans, but not in White-Americans. The authors suggest that when students perceived help-seeking as beneficial, it predicted higher self-regulation but only if students came from cultural backgrounds valuing collectivism/interdependence more.

Among other studies focusing on how metacognitive strategies might relate to different cognitive strategies, learning orientations, and conceptions of learning are those applying the Inventory of Learning Styles (ILS) by Jan Vermunt (1998) across the world. This inventory includes 20 sub-scales representing a series of cognitive and motivational constructs largely explored within Psychology of Education, with metacognitive strategies being one of them. When analysed through cluster analysis, students' answers to the ILS items point to the existence of four profiles or learning patterns: reproduction directed, application directed, meaning directed, and undirected learning (Martínez-Fernández & Vermunt, 2015; Vermunt, 2005). The use of metacognitive strategies within these patterns is mainly found to be applied by students who direct their learning towards meaning making. Recent cross-cultural research on the ILS inventory, however, has found cultural variability of the learning patterns themselves (and therefore of the aspects related to self-regulation) among and between students from Asian, Latin American and European countries (Marambe, Vermunt, & Boshuizen, 2012; Martínez-Fernández & Vermunt, 2015).

Specifically, the results show that unlike European samples, undergraduates from Latin American (Martínez-Fernández & Vermunt, 2015) and South Asian countries (Marambe et al., 2012) do not consider external regulation to be separate from self-regulation. This might suggest that more directive ways of teaching could be seen as not conflicting with the practice and eventual development of self-regulation in these cultures. Also, some differences among Hispanic countries could be appreciated, with Colombian but not Mexican, Venezuelan or Spanish students, for example, thinking that effort (a motivational component of self-regulation) is unrelated to academic performance (Martínez-Fernández & Vermunt, 2015). Even though these studies have been conducted with University students, they provide important evidence suggesting how self-regulatory behaviours might relate differently to social dynamics (such as directive teaching) and productive results (such as effort over performance), according to culture. Together with the studies of Purdie, et al. (1996) and Hinnant-Crawford, et al. (2016), in line with *culturally adaptive functionality* theory, the results suggest that both attitudes and strategies can take different self-regulatory functionalities according to culture

2.4. Conclusions from the literature I

In general, the results from cross-cultural research on self-regulation suggest that culture is indeed an important factor in terms of understanding the development of self-regulation. The findings not only indicate that self-regulation might be developed to different degrees in different cultures, but also that, in line with cultural values, different self-regulatory strategies might be adopted (e.g., memorizing, help seeking) and even have different functionality (e.g., effort) for productive learning. Overall, these findings substantiate to some degree the thesis of the *culturally adaptive functionality* of self-regulation development, explored throughout this study. They support the hypothesis of self-regulation developing in order *to function* within a particular cultural context, through *different behavioural strategies* or with similar behavioural strategies that acquire *different functionalities*. The evidence, however, is incipient, not explored in children, or substantiated only by self-reports and not observing characteristics of cultural contexts with measures of self-regulation as seen in real practice. One objective of this study, therefore, is to bridge this gap in order to support a stronger argument for the *culturally adaptive functionality* of self-regulation development.

2.5. Motivation underlying self-regulation

As initially indicated when introducing the concept of self-regulation, motivation plays an important role as a part of self-regulation. The evidence has shown how the mere knowledge of strategies for learning does not ensure self-regulated learning (Zimmerman, 2011), because self-regulated learning processes usually require additional time and effort (Schunk & Zimmerman,

2008). Motivation, therefore, plays a key role in initiating, guiding and sustaining students' efforts to self-regulate their learning (Dignath & Büttner, 2008; Järvelä, Järvenoja, & Malmberg, 2012; Zimmerman, 2011). As a consequence, and similarly to the findings reported for early childhood self-regulation, the socio-emotionality of learning environments can be very important for school children's development of self-regulation.

A distinctive feature of primary school children is their adoption of personal beliefs about competence and what it means to be competent. These are beliefs that start developing more strongly from the last year of pre-schooling (Tomasetto, Mirisola, Galdi, & Cadinu, 2015). There is growing evidence for a reciprocal interaction between self-regulated learning and personal motivational beliefs related to competence such as self-efficacy, self-theories of intelligence, and achievement goal orientations (Schunk and Zimmerman, 2008; Zimmerman, 2011). While these motivational beliefs constitute different psychological constructs, they have been found to relate highly to each another (see Chen and Wong, 2015; Cho and Shen, 2013; Dinger and Dickhä, 2013; Diseth, Meland, and Breidablik, 2014; Dull, Schleifer, and McMillan, 2015; Komarraju and Nadler, 2013). Of all these highly related motivational beliefs, achievement goal orientations (i.e. achievement goals or goal orientations) seem to be well suited for a cultural enquiry. Goal orientations could be considered to represent social values and motives surrounding learning achievement, both of which are considered to be defining elements of culture (Guay, 2016; Zusho & Clayton, 2011). More specifically, they represent the extent to which particular education cultures value understanding and self-improvement v. good performance and over-performing others, as well as motives (reasons) for learning appropriated by students from cultural expectations of children development socialized within schools (Hedegaard, 2012; Winther-Lindqvist, 2012).

In particular, goal orientations reflect the general purpose or reasons behind the learners' engagement with the achievement task and the evaluation criteria they apply to assess their own success in it (Pintrich, 2003; Zimmerman, 2011). A goal type or orientation could be defined according to two dimensions: its locus of reference (intrapersonal/normative) and its valance (focus on positive possibility/negative possibility). The goals focused on positive possibilities (seeking achievement) are labelled as mastery-approach goals if they are influenced by intrapersonal standards, or performance-approach goals if they are based on normative standards (Fryer & Elliot, 2008). On the other hand, the goals focused on negative possibilities (failure avoidance) are labelled as mastery-avoidance goals when influenced by intrapersonal standards, and performance-avoidance goals when based on normative standards (Fryer & Elliot, 2008). Students have been found to adopt different, even conflicting, types of goal orientations simultaneously (Barron and Harackiewicz, 2001; McLellan, 2006), which are also likely to change over time (Järvelä & Salovaara, 2004).

Classrooms have been found to have an important influence on the type of achievement goal orientations students endorse and, as a consequence, on students' self-regulation as well. The relevance of classrooms for students' adoption of achievement goals has been found to be so strong that it even exceeds that of the achievement values communicated by students' families (J.-I. Kim et al., 2010) and can override the effect of students' previous achievement goal orientations over learning behaviours and outcomes (e.g., Linnenbrink, 2005). Classrooms exert an influence over students' achievement goal orientations through the type of achievement goals communicated as valued within them by their teachers (Darnon, Dompnier, and Poortvliet, 2012; Kim, Schallert, and Kim, 2010; Rolland, 2012; Stipek, Givvin, Salmon, and Macgyvers, 1998). These are known in the literature as classroom structures (Ames, 1992) or classroom goal structures (Midgley, Kaplan, & Middleton, 2001).

2.5.1. Classroom motivational structures

In practice, "goal structures refer to messages in the environment (e.g., classrooms, schools) that make certain goals salient" (Urdan, 2004b, p. 222). Classroom goal structures can be communicated to students through different channels, including the way that learning tasks, evaluation/recognition and authority are managed by teachers in the classroom (Ames, 1992). They have also been associated to the way students' understanding and motivation are supported through teacher-student interaction (e.g., Turner et al., 2002). The study of these structures has generally been carried out through questionnaires measuring students' general appreciations of teachers' actions and their own classroom environments (Lawrenz, Huffman, & Robey, 2003; Rolland, 2012).

In general, the literature on classroom goal structures indicates that students tend to adopt goal orientations that are coherent with the classroom goal orientations they perceive as salient (Ames, 1992; Fryer and Elliot, 2008; Linnenbrink, 2005; McLellan, 2006; Meece, Anderman, and Anderman, 2006; Wolters, 2004). When students perceive that teachers value effort, understanding, endorse a belief that all students can succeed, or try to make the taught content interesting, students tend to adopt higher levels of mastery orientation (Bong, 2005; Church, Elliot, & Gable, 2001; J.-I. Kim et al., 2010; Murayama & Elliot, 2009; Urdan & Midgley, 2003). On the other hand, when students perceive that teachers emphasize competition or social comparison, for example, by communicating a special value of good grades or favour high performers, students tend to adopt performance approach and avoidance goals to greater extents (Church et al., 2001; Roeser, Midgley, and Urdan, 1996; Urdan and Midgley, 2003; Wolters, 2004). Similar results in terms of performance and mastery classroom goal structures and students achievement goal orientations have been found when applying observational methods rather than students' self-report to assess classroom goal structures (e.g., Stipek et al., 1998).

2.5.2. Importance of goal structures and orientations over effort and self-regulation

Goal orientations have been found to be associated to a wide number of motivational and behavioural dimensions closely related to self-regulated learning. Mastery-approach goals, for example, have been found to relate to an incremental theory of ability (Cury, Elliot, Da Fonseca, & Moller, 2006; Dweck & Leggett, 1988), challenge appraisal (Fryer & Elliot, 2008), and adaptive help-seeking (Linnenbrink, 2005). On the other hand, performance-avoidance goal, grounded in students' fear of failure, has been shown to be related to factors and behaviours undermining self-regulated learning such as an entity theory of ability (Cury et al., 2006), self-handicapping (Fryer & Elliot, 2008), avoidance of help-seeking (Middleton & Midgley, 1997), and disengagement (Wolters, 2004). Performance-approach goals have a more inconsistent profile in relation to motivational factors and behaviours closely related to self-regulated learning. This inconsistency might be due to the fact that they are held by students who have both the need for achievement and fear of failure (Fryer & Elliot, 2008; Linnenbrink, 2005); a need and fear which, in turn, have been found to relate positively and negatively to metacognitive strategy use, respectively (Bartels & Magun-Jackson, 2009).

Some direct links have also been stablished by the literature between goal orientations and goals structures on the one hand, and self-regulation on the other. In a longitudinal study interviewing 18 students throughout 3 years, Järvelä and Salovaara (2004), for example, found that the level of variety of learning strategies applied by students was related to their goal orientations. In the years when students expressed ideas reflecting the pursuit of mastery-approach goals, they also reported a higher number of types of learning strategies. Conversely, when they did not express any ideas reflecting their learning goals (in relation to either mastery or performance), they reported less variety of learning strategies. Performance orientation was not found to be related to the variety of strategies applied either. Moreover, the researchers did not find clear relationships between particular types of goal orientations and specific learning strategies. Other studies have found relationships between goal orientations and the quality of self-regulatory strategies applied by students. For example, through the application of questionnaires, Phan (2009b) found that University students' mastery-approach and performance-approach goals predicted reflection about previous performance (evaluation), but that strategies used to ensure understanding (what the authors called 'deep processing strategies') only related to mastery goals.

Similarly, but now within a high school context, Kaplan, Lichtinger, and Gorodetsky (2009) looked at the relationship between goal orientations and quality of self-regulation in writing, also including classroom structures as predictors. They operationalized self-regulation in a detailed way, exploring 14 specific cognitive and metacognitive strategies self-reported via

questionnaires by 9th graders. Self-regulatory behaviours such as planning ahead, monitoring content, and self-evaluation related positively to all types of goal orientations and classroom structures. Help-seeking related positively to all types of goal orientations but only to a mastery classroom structure. Checking and correcting related positively to mastery-approach and mastery structures. Planning during writing related positively to all types of classroom structures, but only to mastery orientations (approach and avoidance) and not performance orientations. The results of these (limited) studies suggest that while some self-regulatory behaviours can relate to any type of goal orientation and structure, a higher variety of other strategic behaviours including those focused on understanding and improving, as well as asking for help, might only relate to mastery orientations and structures.

Other studies have also found relationships between achievement goal orientation and the use of learning strategies, but have found that this relationship, rather than being a direct one, should be considered as mediated by effort (Miñano Pérez, Castejón Costa, & Gilar Corbí, 2012). In line with this claim, some researchers have looked at the relationship between classroom goal structures or students' goal orientations on the one hand, and students' effort or activity engagement on the other. Among these studies, of special interest is that of Lau and Nie (2008). The authors looked at the relationships between classroom structures and student self-reports of engagement (attention, effort and participation in class), effort withdrawal (holdback to minimize effort), and avoidance coping (giving up when facing difficulties) in maths, in around 4000 fifth grade students from 130 primary school classrooms. Findings show that classroom mastery structures were related to lower effort withdrawal and lower avoidance coping, and that performance structures were related to lower engagement and higher effort withdrawal and avoidance coping. Most interestingly, the authors also found that when controlling for personal goal orientations, classroom structures accounted more for maladaptive effort strategies than adaptive ones, or student achievement. Specifically, classroom structures accounted for 56% of avoidance coping and 40.3% of effort withdrawal, in comparison to 14.6% of engagement and 27.2% of student achievement, suggesting their importance for student management of effortful learning behaviour.

At the level of personal goals, in their reviews, Hulleman et al. (2010) and Linnenbrink-Garcia et al. (2008) reported consistent relationships between both mastery and performance approach orientations and higher levels of effort/persistence. Conversely, lower levels of effort/persistence were reported to be consistently associated with mastery and performance avoidance orientations in both reviews. The same trend has been found in more recent studies, when predictions were controlled by sex, ethnicity, grade and age (e.g., Liem, 2016), as well as studies looking at this relationship across school subjects (e.g., Naudi, 2012). The results of the studies reviewed suggest that higher effort might be related to classroom cultures promoting

mastery, or to personal goals adopted where students pursued feeling competent (either mastery or performance approach orientations) rather than avoided failing.

In more general terms, the literature suggests that some important relationships exist between goal orientations and classroom structures with self-regulatory strategies, effort investment and other psychological aspects closely related to self-regulation. The studies reported above, however, have not considered how goal orientations might take different roles, or *functionalities*, over self-regulation and effort within different cultural contexts. This is not surprising because, as pointed out by Guay (2016), very little is known about the importance that culture might have for these goals. In the next section, the few studies and reviews found in the literature attempting to make connections between culture and goal orientations will be reviewed.

2.6. Culture and achievement goal orientations

The extent to which people adopt different achievement goal orientations has been found to vary according to culture. Chinese students, for example, have been found to strive towards more performance goals and less mastery goals than American students (Gao, Xiang, Harrison, Guan, & Rao, 2008; Hayashi & Weiss, 1994; Isogai, Brewer, Cornelius, Etnier, & Tokunaga, 2003; Xiang, Lee, & Solmon, 1997). Moreover, collectivist cultures have been found to adopt more avoidance than approach orientations relative to individualistic cultures (Elliot et al., 2012; Elliot, Chirkov, Kim, and Sheldon, 2001).

2.6.1. Achievement goals and effort across cultures

Some studies have looked at the way in which personal variables, considered to be based on collectivist-individualistic cultural values variations, influence the relationship between achievement goals and effort. Apart from country of origin, among the personal variables these studies have explored as indicative of cultural values are: family orientation; independence or interdependence of self-construal; and social or personally motivated goals. Among the outcome variables explored are effort investment, attribution of success to effort, and self-handicapping behaviours.

The extent to which students attribute success to effort rather than ability has been found to vary across cultures. In general, while more collectivist cultures tend to attribute success to effort, more individualistic cultures attribute it to ability (Bennett & Flores, 1998; Dandy & Nettelbeck, 2002; Georgiou, 1999; Phillipson, 2006; Rogers, 1998). Some studies have found similar directionality of the way achievement goal orientations relate to attributing success/failure to effort or ability in different cultures, with the relationship differing only in intensity (e.g., Niemivirta, Rijavec, and Yamauchi, 2001). But more recent studies have found that when considering other personal cultural aspects related to individual degrees of

collectivism (adoption of social goals, family orientation, interdependent self-construal), the relationship between achievement goal orientations and attributing success to effort disappear, indicating the importance of internalized cultural values instead.

For example, within Taiwan, students tend to attribute success to effort only when making attributions about social goal outcomes (those expected of students by others) rather than personal goal outcomes (S. Chen, Wang, Wei, Fwu, & Hwang, 2009). Similarly, a study by Luo et al. (2014) conducted in Singapore, revealed that people who have developed a stronger sense of self in reference to in-group characteristics (i.e. interdependent self-construal) tended to attribute success to effort, independently of their achievement goal orientations. Within more individualistic cultures, however, achievement goal orientations have been found to have more clear relevance for attribution of success to effort. Wolters, Fan, and Daugherty (2013), for example, found that White-American students' achievement goal orientations were significantly related to attributing success to effort, and that higher levels of mastery orientation make these students less likely to attribute failure to a lack of effort. Similar trends can be found in a study outside attribution research. For example, Shim and Finch (2014) found that in American students, mastery approach predicted higher academic engagement regardless of their social goals (i.e. to avoid the lack of social competence, or approach either demonstration or development of social competence).

It is, therefore, possible to hypothesize that achievement goal orientations could have a much more important role in attributing success to effort in individualistic cultures, or people holding more individualistic values, than in those acculturated within collectivistic values. From an alternative perspective, however, these relationships might depend rather on the level at which effort is valued within each culture. As Hau and Salili (1990) point out, for example, Hong Kong students are used to teachers not praising or blaming them based on ability but on effort. In a similar fashion, unlike Anglo-American students, Chinese-Americans have been found to interpret their peers' help-seeking behaviour as lack of effort (Bennett & Flores, 1998). This is not the case with students within other Western contexts, where teacher praising, blame, sympathy, or help can be read by students as information about either ability or effort, depending on the level of task challenge (Graham, 1991; Graham & Williams, 2009). So, in some cases, such as the Chinese case, the results might be explained by the cultural relevance of effort investment.

Also, more broadly speaking, it is also possible to argue that the lower relevance of achievement goal orientations to personal collectivism over attributions of success to effort might be due to cultural meanings. Specifically, the similarity of the meaning given by collectivists, both in Asia and Latin America, to mastery and performance orientations. As the literature shows, unlike more individualistic contexts, these orientations are often found to be highly and positively correlated in students from Asian and Latin American countries (Extremera, Ruiz, Granero-

Gallegos, Science, & Santiago, 2016; R. B. King, Ganotice, & Watkins, 2014; Lee, Tinsley, & Bobko, 2003; Niemivirta et al., 2001; Rogers, 1998), as well as in more collectivist European countries, such as Croatia[5] (see Niemivirta et al., 2001).

Other comparative or single-nation studies carried out around the world linking achievement goal orientation with variables indicative of investment of effort (self-handicapping, persistence), might contribute to a better understanding of the cultural functionality of these orientations for this motivational behaviour of self-regulation. For example, a study carried out by Gao et al. (2008) comparing Chinese and White-American University students that included sports in their weekly activities, found some interesting cultural differences in the way that goal orientations predicted self-reported persistence. While in American students persistence was found to be positively predicted by task orientation (an orientation similar to mastery orientation), in Chinese students persistence was positively predicted by ego orientation (an orientation equivalent to the 'outperforming others' component of performance approach). The percentage of the variance of persistence explained by these goal orientations, however, varied to a great extent, being greater in American (19%) than Chinese students (4%)[6]. The results regarding the functionality of these goals are interpreted by the authors in relation to what the sociocultural context expects from students regarding sports. That is, demonstrable and high performance within a competitive effortful Chinese context, and self-actualization and realization of individual potentials in the American context.

Studies on self-handicapping, on the other hand, have found that the type of underlying achievement goal orientations and motives have similar functionalities for this effort related achievement behaviours across cultures. In a study carried out in relation to University sports among 691 Taiwanese students using questionnaires, L. H. Chen, Wu, Kee, Lin, and Shui (2009) found that higher performance avoidance and mastery avoidance orientations predicted higher levels of self-handicapping (i.e. claiming or creating obstacles to account for poor performance) through either making excuses or reducing effort. Conversely, approach orientations predicted lower levels of self-handicapping. The authors considered the results to be similar to those found by other researchers in the West, despite avoidance orientations being more in line with the Eastern cultural pressure of not making mistakes or losing. Similarly, another study by De Castella, Byrne, and Covington (2013) found that both Japanese and Australian high school students self-reported higher levels of self-handicapping when they indicated higher levels of fear of failure (a motive underlying mastery and performance avoidance orientations). Students of both countries also reported lower self-handicapping when they were more highly oriented

[5] According to the comparative web tool Hofstede, Croatia could be considered to be even more collectivist than Japan - https://geert-hofstede.com/croatia.html

[6] The low level of variance of Chinese students' persistence explained by achievement goal orientations was not discussed by the authors, but as mentioned before, it is likely to relate to the higher relevance of more collective orientations and the generalized value over effort within the culture.

towards success (a goal closely related to mastery and performance approach orientations). The only difference between the samples was that at lower success orientation, students from Australia tended to self-handicap more than Japanese students.

Overall, the results indicate how the consideration of students' culture and personal collectivist orientations is relevant in understanding the way in which different achievement goal orientations might lead to the value of effort for success and student persistence. Specifically, they indicate that goal orientations might be more relevant for effort beliefs in individualistic cultures, and that different orientations may be predictive of effort investment in different cultures, with those orientations that are more socially-referenced being more relevant for effort among collectivists. Culture did not, however, necessarily explain the function that goal orientations had on maladaptive behaviours such as self-handicapping.

2.6.2. Achievement goals and self-regulation across cultures

Similar to the role of achievement goal orientations over effort, the role of achievement goal orientations over self-regulation across cultures has been researched to a limited extent. There are, however, a few recently published studies available, which are reviewed within this section. Some of them are comparative, while others are single-nation studies carried out in Western and Eastern societies.

Within the United States, for instance, in a sample of mainly White-American secondary school students, Wolters et al. (2013) found that mastery approach was the strongest achievement goal orientation predicting students' use of metacognitive strategies for learning algebra. Performance approach was also found to have a positive predictive functionality, although weaker, over self-regulation. Performance avoidance was not found to have any significant effect over self-regulation. The results were controlled for the level to which students attributed success and failure to effort or ability. Another study carried out by Shim and Finch (2014) among middle school American students suggested that academic achievement orientations were more important than social achievement orientations for self-regulation in these students. Specifically, the authors found that those students who were more concerned with achievement goal orientations in general (i.e. mastery approach, performance approach, performance avoidance) self-reported higher levels of self-regulation regardless of the extent to which they were, or were not, oriented towards social achievement goals (developing social competence, demonstrating social competence, avoiding demonstrating social incompetence). Similar results were found for socially mediated self-regulatory behaviours, such as adaptive help-seeking. The results indicate that within a Western context, such as the American, self-regulation can be energized from any type of achievement goal orientation. Moreover, self-regulation does not seem to be connected to the degree to which these students pursue social achievement goals.

Another study by Urdan and Giancarlo (2000) looked at the relationships between achievement goal orientations and self-regulation in students from 1st, 2nd and 3rd generation of Asian and Latin American collectivist migrant families in the United States. Students from families that had been in the US for longer were found to be more assimilated to the host culture, as revealed by their lower (more individualistic) attitude towards family obligation. The authors found positive relationships between mastery orientation and self-regulation across all students, but reported weaker relationships among these variables in students from families more recently arrived, less acculturated to the United States. They also found negative relationships between performance approach and avoidance orientations and self-regulation in 1st and 2nd generation students, but no effects in the more individualistic 3rd generation. The authors were able to explain their results by including family obligation to the equation as a sign of collectivism. In particular, mastery approach was found to be more productive for self-regulation when students were less concerned about their families (more self-centred). Performance approach and avoidance orientations, on the other hand, were found to have a negative role in self-regulation, but only in students who were more concerned about their families (more community-centred). The study suggests that mastery has a stronger productive functionality for self-regulation over students that are less collectivist, and that performance orientations can have a damaging functionality in collectivist individuals. These motivational dynamics, however, are difficult to interpret in this study, due to the embedded confusion within participants of cultural values from the host culture and *brought-in* individual cultural values from their families' home culture.

Within the more collectivist context of Indonesian secondary school, Liem (2016) found similar functionalities of achievement goal orientations over self-regulation to those found by Wolters et al. (2013) within the United States. A small difference between the studies, however, was that within this study, mastery approach was found to have similar predictive strength over self-regulation than performance approach, and not a stronger one, as Wolters et al. had found in the US. No significant effects were reported for performance avoidance orientation over self-regulation in this study either. Moreover, somewhat similar to the American study of Shim and Finch (2014), the results considered students' social achievement goals, as well as academic achievement goals, although in this case the study focused on the independent effects of the variables rather than different student profiles. Of the social goals explored, pursuing development of social competence had a positive independent predictive effect of similar magnitude to that of mastery approach over self-regulation. Additionally, wanting to demonstrate social competence to others was found to have an independent negative predictive effect over self-regulation. These results suggest that within collectivist contexts, unlike more individualistic contexts, such as the US, not only academic but also social achievement goal orientations have a motivational function over self-regulation.

King et al. (2014) found similar results to those of Liem (2016) in a study exploring the importance of achievement goal orientations and social goals over self-regulation in secondary school students from the collectivist contexts of the Philippines and Hong Kong. In line with the results produced in the West, mastery goals were found to be the stronger predictor of self-regulation in both countries. The authors found positive effects of social status goals over self-regulation. These positive effects were stronger than those found for performance orientation.

Besides the importance that social goals might have for self-regulation in collectivists, perhaps a more revealing finding is that of King (2016) regarding the functionality of performance avoidance orientation over self-regulation in the Philippines. By exploring motivational attitudes in more than a thousand Filipino secondary students, King (2016) found that the role of performance avoidance over self-regulation was moderated by students' levels of collectivism. Specifically, the results showed that when students' level of collectivism was high, performance avoidance had adaptive outcomes including higher levels of metacognitive monitoring (as well as higher use of elaboration as a cognitive strategy). In addition, the study showed that all types of achievement goal orientations were positively productive to some extent for self-regulation in the participating students. Mastery approach had, once again, the strongest positive effects over self-regulation.

In general, the results from the few available studies looking at cultural variations of the relationship between achievement goal orientations and self-regulation indicate some important similarities and differences across cultures. Among the clear similarities is the role of mastery approach. Mastery approach had a strong and reliable productive functionality for self-regulation across the different cultures studied. The role of performance orientations, however, is less clear, although most studies show positive effects of performance approach across more collectivist and individualistic contexts over self-regulation. Moreover, the functionality of performance avoidance over self-regulation is more intriguing. In some studies it shows a positive functionality, while in others a negative, or none at all. It is interesting to note, however, that the only studies where performance avoidance was found to have a negative functionality did explore collectivist students situated within an individualistic broader culture. In addition, at least within one collectivist context, higher levels of performance avoidance were found to correspond with higher levels of self-regulation, with students that were more collectivist themselves demonstrating the most positive effects of all.

It is important to point out that all the comparisons presented in this section make use of self-report measures and reflect motivational dynamics of secondary schools or older students. The results, therefore, might not be generalizable to primary school students. Despite this limitation, the studies are instrumental in suggesting that the functionality of achievement goal orientations over self-regulation, at least as self-reported, might vary across cultures, especially across the collectivist-individualistic cultural axis. More studies linking achievement goal

orientations with primary school students' self-regulation, however, can be found within the literature on help-seeking. The next section summarizes the findings from this literature.

2.6.3. Achievement goal orientations and help-seeking across cultures

The studies linking achievement goal orientations and students' help-seeking can be illuminating in understanding how these motivational beliefs relate to self-regulated learning. Even though comparative studies examining this relationship do not seem to exist, there are enough studies from around the world to allow for examining the cultural functionality of achievement goal orientations over help-seeking. It seems relevant to note, nevertheless, that not all help-seeking can be considered to be self-regulatory. Such is the case of what has been labelled as executive help-seeking, which generally attempts to obtain an answer to a particular problem, or obtain a short-cut to complete a task without much effort (R. Butler & Neuman, 1995; Veenman, Denessen, van der Akker, & van der Rijt, 2005). There are, nonetheless, more adaptive ways of help-seeking which can be considered to be self-regulatory. Generally, these take the form of students' questions aiming to improve mastery by getting guidance for understanding or to get back on track in a task. These types of questions and behaviours are generally labelled as adaptive or instrumental help-seeking (R. Butler & Neuman, 1995; Veenman et al., 2005).

There are a number of studies looking at the functionality of achievement goal orientations over adaptive and maladaptive help-seeking within the Western context. Within England, for instance, Harris, Yuill, and Luckin (2008) found that 8 to 10 year-old students (predominantly White-British), who held or were induced to adopt performance orientations, tended to engage in more executive (maladaptive) help-seeking than those who held or were induced to adopt mastery orientations. In France, Roussel, Elliot, and Feltman (2011) found that mastery approach and avoidance had a positive predictive effect over adaptive help-seeking in secondary school students. Performance avoidance, on the other hand, was found to have a negative effect over students' adaptive help-seeking.

The positive predictive relationship between mastery approach and adaptive help-seeking, or less maladaptive help-seeking, has also been replicated in Northern European countries, such as Norway. Ommundsen (2006), for instance, found that Norwegian secondary school students self-reported higher levels of adaptive help-seeking in Physical Education when they held a mastery approach or when their teachers structured the lessons in a mastery way. Although performance goal structures or personal orientation were not found to have any effects on help-seeking in this study, in another study conducted in Norway, Federici, Skaalvik, and Tangen (2015) found that they did. The authors found a negative effect of performance avoidance orientations over asking the teacher for advice in middle school Norwegian students. Also,

similarly to all other studies carried out with White-European samples, mastery approach was found to have a positive effect on students asking for help in adaptive ways. Within the United States, Shim, Kiefer, and Wang (2013) found similar results to those reported for Europe among predominantly white middle school students. The authors found that classroom structures focused on mastery tended to enhance students' adaptive help-seeking from peers, lower executive help-seeking, and lower avoidance of help-seeking from peers.

Within more Eastern contexts, results are not too different. A study carried out by Mok, Kennedy, Moore, Shan, and Leung (2008) among more than 25,563 Chinese and Taiwanese students found that, in general, these students tended to ask for help in order to advance their mastery rather than their school performance. The findings also found that this tendency was similar for students of all levels of school achievement. The mastery meaning that these students attributed to help-seeking has been echoed by other studies in Asia. In Korea, Bong (2008), for example, found that mastery classroom structures and students' mastery orientations predicted lower help-seeking avoidance, while their performance equivalents predicted higher help-seeking avoidance in secondary school students.

When exploring the same type of relationship within Korean students in lower primary school (Year 1 to 3), upper primary school (Year 4 to 6) and middle school (Year 7 to 9), Bong (2009) also found that higher levels of mastery approach were related to lower levels of help-seeking avoidance in middle school. Moreover, while higher performance avoidance was found to predict higher levels of help-seeking avoidance in all age groups, performance approach orientation was not found to be related to help-seeking avoidance in any age group. Additionally, higher mastery avoidance was found to relate to higher levels of help-seeking avoidance only in upper primary school. Finally, within Taiwan, Shih (2007) found that students tended to avoid help-seeking when they adopted higher levels of performance avoidance orientation. Conversely, students showed lower levels of help-seeking avoidance when they adopted higher levels of mastery approach or perceived their classroom to be more mastery focused. Among these students, the adaptive effects of mastery approach over help-seeking were found to be even stronger when students perceived mastery structures in their classrooms.

In general, the results from Western and Eastern countries suggest that while mastery approach orientations and mastery structures are productive for approaching help-seeking and adaptive help-seeking, performance avoidance tends to lead to maladaptive help-seeking or help-seeking avoidance. Performance approach, on the other hand, if found to have an effect over help-seeking at all, seems to bring maladaptive consequences. These results, nevertheless, have to be considered with caution for the case of young children, as they are all based in self-report measures which, as will be elaborated in the methodology chapter (Section 3.4.2.1), are difficult to equate to observable behaviour or psychological attitudes in young children.

2.7. Conclusions from the literature II

Taken together, the research reviewed regarding achievement goal orientations, allows us to argue that the evidence about the functionality of these orientations over self-regulation and effort, but not for self-handicapping or help-seeking, might be culturally specific to some degree. The results obtained from help-seeking studies, however, do not reflect conclusions from comparative studies. Therefore, they could be due to the differences in the adapted applied Western measures used. Moreover, with the exception of one study (Järvelä & Salovaara, 2004) none of the studies reported tapping on the motivational dynamics of self-regulation used open ended qualitative methods for the exploration of students' achievement goal orientations. This precludes rescuing the cultural richness of student motives and goals for learning within the different contexts studied. The importance of classrooms was also generally considered in relation to the extent to which students perceived their classroom's structures rather than to the more specific questions about the behaviours they observed in their teachers, or through direct observation measures of actual teaching generating the motivational culture of the classrooms. This makes it difficult to separate cultural contexts from students' perceptions of their own culture. The present study, thus, will attempt to bridge some of the limitations of the current research exploring the *culturally adaptive functionality* of achievement goal orientations for self-regulation, with special attention to young students, attempting to make, therefore, methodological as well as theoretical contributions to the field.

2.8. Research questions of the present study

As this review of the literature suggests, despite extensive research pointing out the importance that culture might have for self-regulation – focusing on showing cultural differences of levels of self-regulation until now – very little has been done to understand the ways in which the particulars of specific cultures may actually exert an influence over self-regulatory habits. We do have much more clarity, however, in the way in which culture influences beliefs and motivational attitudes relevant for learning of youth and older students. Based on lessons taken from the motivation literature, insights about human development offered by sociocultural perspectives, and the extant self-regulation research, this study hopes to help bridge the gap in our knowledge about the relationship between culture and self-regulation in children. Specifically, and based on the cues offered by the researchers and theorists reviewed in this chapter, this work aims to explore if self-regulation, and the motivational attitudes supporting it, could be said to develop and be adopted to fulfil *culturally adaptive functionalities* from an early age. To explore this CAF theory, this study will address the following research aims and questions across cultures.

Aim 1. To understand the role that culture might have in students' self-regulatory practices in terms of levels and functions.

- R.Q.1. *Do the self-regulatory behaviours and related levels of task achievement of 8 to 9 year-old Chilean and English students vary in extent across countries? If yes, how?*
- R.Q.2: *Do the self-regulatory behaviours of Chilean and English 8 to 9 year-old students differ in the underlying self-regulatory factors (processes) they represent? If yes, how?*
- R.Q.3. *Do the same specific self-regulatory behaviours relate to levels of task achievement in both Chilean and English 8 to 9 year-old students? If not, which ones are most related to task achievement in each group?*

Aim 2. To understand the role of culture in the levels and function of students' achievement motivational attitudes underlying self-regulation.

- R.Q.4 *Are there any differences between Chilean and English 8 to 9 year-old students in the achievement motivational attitudes they tend to adopt? If yes, how do they differ?*
- R.Q.5 *Does the way that achievement motivational attitudes predict effort in Chilean and English 8 to 9 year-olds differ? If yes, how?*
- R.Q.6 *How and to what extent does the motivational role that achievement motivational attitudes have for self-regulatory behaviours vary between Chilean and English 8 to 9 year-old students?*

Finally, given the relevance that motivational and cognitive characteristics of classrooms, and more specifically teacher-student interactions, has been reported to have for children's self-regulation (Section 2.2) and motivational attitudes supporting self-regulation (Section 2.5), the importance of classroom cultures sustained by teachers for students' self-regulation will also be explored. The specific research aim and research questions that will be guiding this enquiry are the following:

Aim 3. To understand the importance of classroom cultures for students' self-regulation, and the specific effects of motivational and cognitive characteristics of teacher talk sustaining such cultures.

- R.Q.7. *What is the relevance of classrooms and the cognitive culture sustained within them by teachers through 'regulatory talk', for students' self-regulatory behaviours?*
- R.Q.8. *What is the relevance of classroom motivational culture sustained by teachers through 'socio-motivational talk' for students' self-regulatory behaviours?*

The next chapter introduces the methodology followed to answer all these questions.

3. RESEARCH METHODOLOGY

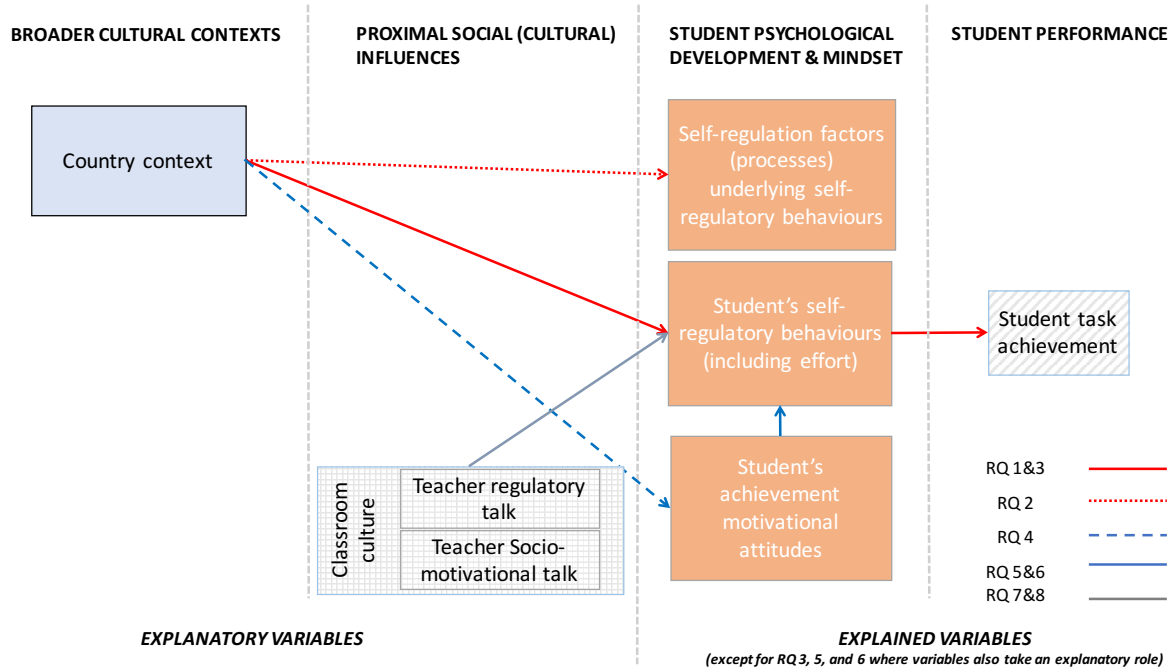
The objective of this chapter is to introduce the methodology of the study. Within this chapter, the reader will be able to find i) an overview of the different elements of the study; ii) the study's overall research strategy; iii) sampling procedures and general characteristics of participants; iv) methods and procedures applied for data collection; v) considerations about the validity of the research methods; and vi) ethical issues raised during the stage of data collection. Due to its length, data analysis instruments, procedures and techniques are reported in a separate consecutive chapter. The research questions guiding the definition of the research methodology are reminded here, as a relevant starting point to this chapter.

3.1. Overview of the study

By exploring the research questions introduced in the previous chapter, this study intended to gain further understanding of the role that culture might be playing in students' development of self-regulation and adoption of achievement motivational attitudes (also referred to here simply as motivational attitudes) relevant for self-regulation. The research questions also aimed to understand the function that self-regulation behaviour strategies and motivational attitudes had for students' effort and task achievement in different cultures. Following the literature review, educational cultures were studied both at the level of the country (Sections 2.3 and 2.6) and the classroom (Sections 2.2.2 and 2.5.2).

Individual measures of self-regulation and motivational attitudes were collected at the level of individual students to explore tendencies between and within children from different country samples. Such individual measures were inspired by previous research that found evidence of internalization/appropriation of characteristics of culture in individuals (Sections 2.3 and 2.6). Characteristics of classroom cultures, the most proximal level of educational culture to students, were studied inspired by previous research establishing the relevance of teaching for students' self-regulation and achievement goal orientations (Sections 2.2.2 and 2.5.2). In particular, teachers' classroom discourse sustaining/communicating specific social, motivational and intellectual practices and values through interaction were analysed and considered as possible direct cultural influences over children's self-regulation and motivational attitudes relevant to self-regulation. Figure 3.1 shows an overview of the study (arrows indicate relationships and are colour coded according to chapter addressing them).

Figure 3.1 Overview of the study



As will be explained in more detail in the second methodology chapter, different measures were developed and adapted to analyse the 3 types of data considered within this study: students' self-regulation behaviours, *effort*, and task achievement (*final task accuracy*), students' achievement motivational attitudes, and teachers' classroom discourse. Students' self-regulation, and task achievement, were studied by analysing the behaviours and products of children's activity through observational scales while they conducted a series of 11-13 cube assembly tasks. Students' achievement motivational attitudes were explored through interviews conducted in pairs, aimed at exploring students' achievement goal orientations. Finally, two types of teachers' classroom discourse were examined from a series of 3 consecutive everyday Literacy lessons filmed in each participating classroom. These two types of teachers' discourse were teachers' 'socio-motivational talk' and 'regulatory talk' (hereafter types/families of variables studied are enclosed in inverted commas). While the former focused on analysing promoted classroom goal structures (i.e. *talk for mastery*, *talk for performance*, *talk for collaboration*) and students' sense of competence (i.e. *talk for self-efficacy*, *talk against self-efficacy*), the latter focused on how teachers regulated students' thinking (i.e. *directive talk*, *guiding talk*, *self-regulatory talk*) when interacting with them in the classroom (hereafter specific variables studied can be found in italics).

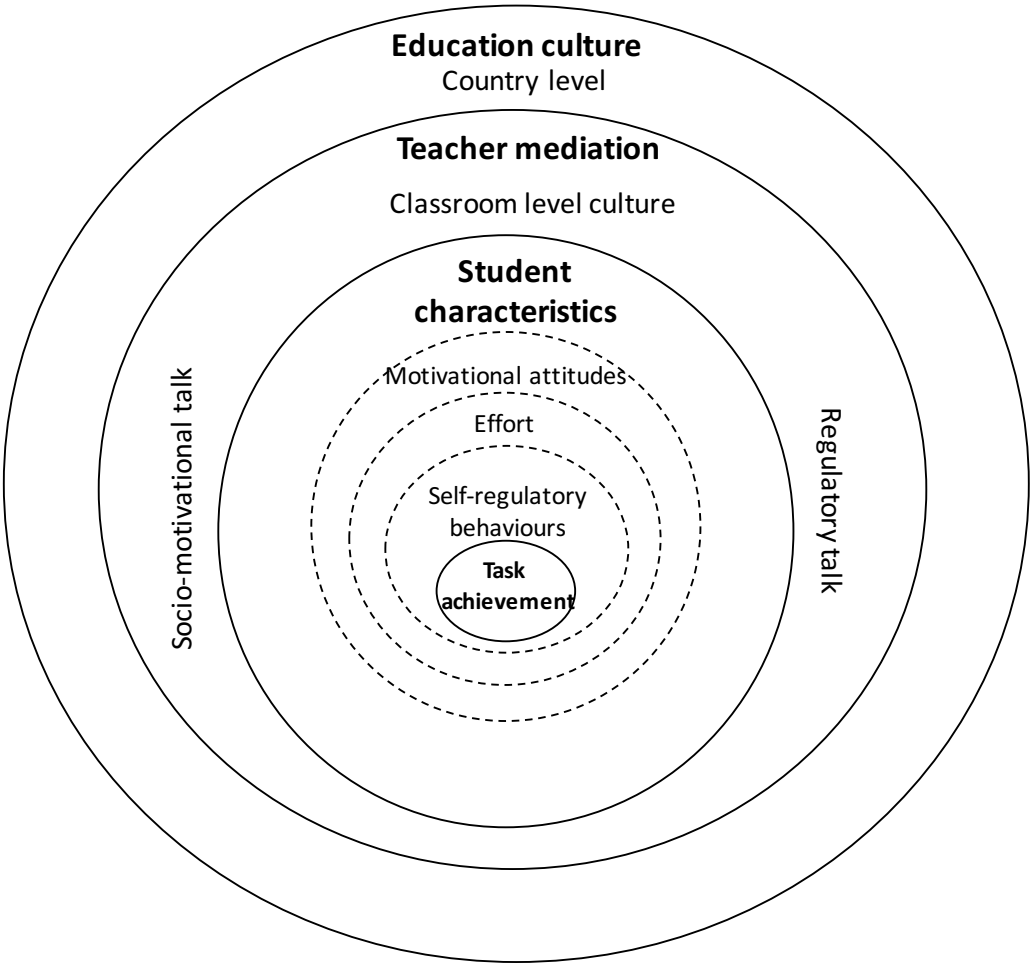
Students' self-regulatory behaviours, as well as the categorization of students' interview answers – achievement motivational attitudes – and teachers' 'socio-motivational' and 'regulatory talk', were all measured following a series of inter-rater processes. These processes ensured good levels of measurement reliability of the data used for statistical analysis after it had been transformed into numbers from its original qualitative form (Boyatzis, 1998). These

measurements allowed for the application of statistical tests that helped answering all the research questions. As can be seen above, various research questions were aimed at exploring the role of educational cultures at the country level for self-regulation and achievement motivational attitudes. Analyses at this level included examinations of differences between country samples regarding the extent to which students demonstrated particular self-regulatory behaviours (R.Q.1) or expressed specific achievement motivational attitudes (i.e. 'orientations', 'achievement motives', 'goal oriented motives') (R.Q.4).

The analysis also included explorations of the functions that the different self-regulatory behaviours and motivational attitudes had for students from each country sample. These functional analyses included explorations of the self-regulation factor (interpreted here as self-regulation processes) that different self-regulatory behaviours represented within each country sample (R.Q.2). These types of analyses also included explorations of the pragmatic/productive effects the different achievement motivational attitudes had over effort (R.Q.5) and self-regulation (R.Q.6), or the effect that self-regulation and behavioural strategies had over task achievement (R.Q.3) in the cube assembly tasks that students carried out for the study. Other research questions explored the role of classroom cultures in students' self-regulation. Specifically, they explored the relevance of classrooms as well as teachers' 'socio-motivational talk' and 'regulatory talk' for students' self-regulation (R.Q.7 and R.Q.8).

As has been already mentioned and can be seen from the outline presented, the overall aim of the study was to explore the role of cultural educational contexts for students' adoption and function of self-regulation and motivational attitudes relevant to self-regulation. In order to achieve this, the study was designed to allow the examination of motivational and intellectual dimensions underlying self-regulation across cultures. Given the key role of teachers in generating and maintaining educational cultures (e.g., promoting values, norms, practices), teacher-student communication was examined as a possible key mediator between the social and individual planes. Figure 3.2 depicts the model of the study, including the type of variables considered and social levels of interest.

Figure 3.2 Model of the study - Researched variables and social levels of interest



3.2. Research strategy

The present study was defined as a small-scale exploratory comparative observational and interview based study including multiple classrooms. The consideration of multiple classroom contexts from different countries allowed for not only treating culture as an independent variable, as many cross-cultural studies tend to do (e.g., Inglehart and Welzel, 2005; Martínez-Fernández and Vermunt, 2015; Schwartz, 2011), but also and, most importantly, it allowed for the examination of culture as enacted in everyday life within the researched educational contexts (e.g., Alexander, 2000; Rogoff, 1990, 2003).

The study is exploratory because of the novelty of its research aim, but also due to the originality of some of its methods. Unlike previous studies, within a single research design it included the study of students' self-regulation, students' achievement motivational attitudes, and teachers' discourse across cultural contexts. It also involved methods other than self-report questionnaires, typically used in cross-cultural research of self-regulation (Section 2.3), or

motivational beliefs (Section 2.6). It applied very detailed measures of classroom culture, analysing every single teacher-student communicative interaction observed in classrooms rather than using questionnaires about classroom climate, typically applied within the study of classroom motivational structures (Section 2.5.1). In line with the exploratory nature of this study, these more open-ended and tailored ways of analysing the data across cultures allowed us to widen the possibility of arriving to new and different types of findings. These methods were adopted in an attempt to reach higher ecological validity, so that the variability and richness of the compared cultures could be captured to a fairer extent, while remaining faithful to the unique characteristics across cases and cultural communities (Angelillo, Rogoff, & Chavajay, 2007).

A mixed-methods approach was used for the data collection and data analysis. Qualitative methods were used during the data collection phase, and quantitative methods were applied during the phase of data analysis. This type of exploratory sequential mixed methods approach has been regarded as particularly appropriate when little research is available in a particular research area, but part of the research requires the examination of factors influencing a particular outcome and relationships between data bases that draw on each other (Creswell, 2014), as was the case of this study. Therefore, the application of a mixed-methods approach was decided following the pragmatic criterion of ensuring the coherence of methods in relation to the research problem at hand (Teddlie & Tashakkori, 2009).

As the main purpose of the study was to explore the role of culture (Section 2.8) over self-regulation and the motivational attitudes underlying self-regulation, the inclusion of the particularities of each cultural context into the analysis (e.g., teaching practices, learning motives, self-regulatory practices) was paramount. The open-ended characteristics of qualitative data rather than the more close-ended characteristics of quantitative data facilitated the inclusion of such particularities to the analysis. For example, qualitative data allowed for the identification of teaching practices found in different classrooms which, although diverse in form, could be seen as having similar regulatory functions.[7] As suggested by Teddlie and Tashakkori (2009), such a tailoring of analytical categories to the data at hand could be thought to strengthen the validity of understanding generated from any subsequent quantitative phases of data analysis.

Moreover, the decision to collect qualitative data was strongly based on successful experiences of previous researchers exploring the importance of culture and social contexts over psychological aspects using qualitative data (see Rogoff and Lave, 1984). The inclusion of

[7]An example is that of observing teachers *requesting more ideas related to student contribution* in one classroom v. observing them *unpacking students' contribution* in another. Both these practices were considered as having the function of guiding students thinking, and were therefore indicators of 'guiding talk'.

qualitative data was also based on the advantages that have been claimed for this type of data when studying micro-social process (Gilbert, 2008), such as teacher-student interactions, forming a central part of this study.

The mixed-methods approach was also considered following an interest in strengthening a comprehensive understanding of the data gathered (Teddlie & Tashakkori, 2009). Quantitative treatment of the transformed qualitative data was found to be helpful in reaching such a comprehensive understanding of the data. In particular, it helped in gaining insights over patterns across participants and samples through single analyses that maximized the consideration of similarities and differences among participants. For example, it helped in determining which particular self-regulatory behaviours could be considered to be part of self-regulation in general, and self-regulation factors in particular, within each country sample. These insights would have been impossible to gain without the aid of such statistical tools given the amount of data (approx. 600 assembled cube figures and 8000 ratings of self-regulatory behaviours within the self-regulation data base only) analysed within this study. Quantitative analysis permitted for exploring research questions that required the exploration of influences of particular aspects of learning (such as behaviours or attitudes) over particular outcomes and helped in answering research questions that required combining data bases that drew on each other (such as relationships between teachers' talk and students' self-regulation).

3.3. Sampling and participants

The sampling process was carried out in three stages and involved various strategies. Most of these strategies were aimed at achieving a stratified purposeful sample of sites, situations, and people based on criterion-based, theory-based and maximum-variation principles (Flick, 2007; Merriam, 2009). The three sampling stages referred to the selection of countries, school/classrooms, and students. An overview of the study's sample is offered before engaging in reporting the specific criteria applied for the sampling at each stage.

3.3.1. Sample overview

A total of eight classrooms working with 8 to 9 year-olds situated in eight different schools participated in the study. Four of these classrooms/schools were from Chile and the other four from England. The classrooms/schools were selected according to their socio-economic characteristics. Within each country sample, two classrooms/schools worked with children from lower-middle socio-economic backgrounds while the other two worked with children from upper-middle and higher socio-economic backgrounds (relative to each country's context). A total of 49 8 to 9 year-old students participated in the study. Of these, 24 were from Chile and 25 from England. Six students were selected from most participating classrooms, with only one

English classroom including seven students. The criteria considered in each stage of the sampling process are presented as follows, starting with country selection.

3.3.2. Country selection

The selection of countries was based on a combination of the maximum-variation principle (Merriam, 2009) and theory-guided criteria (Berry, Poortinga, Segall, & Dasen, 2002). Based on both criteria, it was essential that the two selected countries to be compared were sufficiently different, in order to allow for the examination of the importance of their differences over the variables of interest. This is in line with the view of cross-cultural psychologists who point out that selecting cultural contexts that are different allows for researching the role that those differences may be having on the aspects under study (Berry et al., 2002). If no differences were to be found between the different national contexts, the application of such a maximum-variation principle can also allow for more firm conclusions about the invariability of the aspects of interest across cultures.

Given that the main focus of this study was to understand the role of educational cultures over students' psychological aspects, the selected countries needed to be sufficiently varied in their approaches to education, to allow for meaningful and trustworthy conclusions in relation to the importance of culture. Bearing this in mind, Chile and England were considered as convenient and adequate cultural contexts to carry out the study. They were convenient because of the familiarity of the researcher with both cultural contexts, being originally from Chile and carrying out Doctoral studies in the UK; but, most importantly, the two cultural contexts were considered to be adequate because they differ significantly in their approaches towards primary education (Section 1.2), justifying their selection.

3.3.3. School sampling

Schools were sampled on grounds of authenticity (Alexander, 2000), theory-guided criteria (Berry et al., 2002), accessibility (Cohen, Manion, & Morrison, 2011), and cross-cultural comparability (Berry et al., 2002).

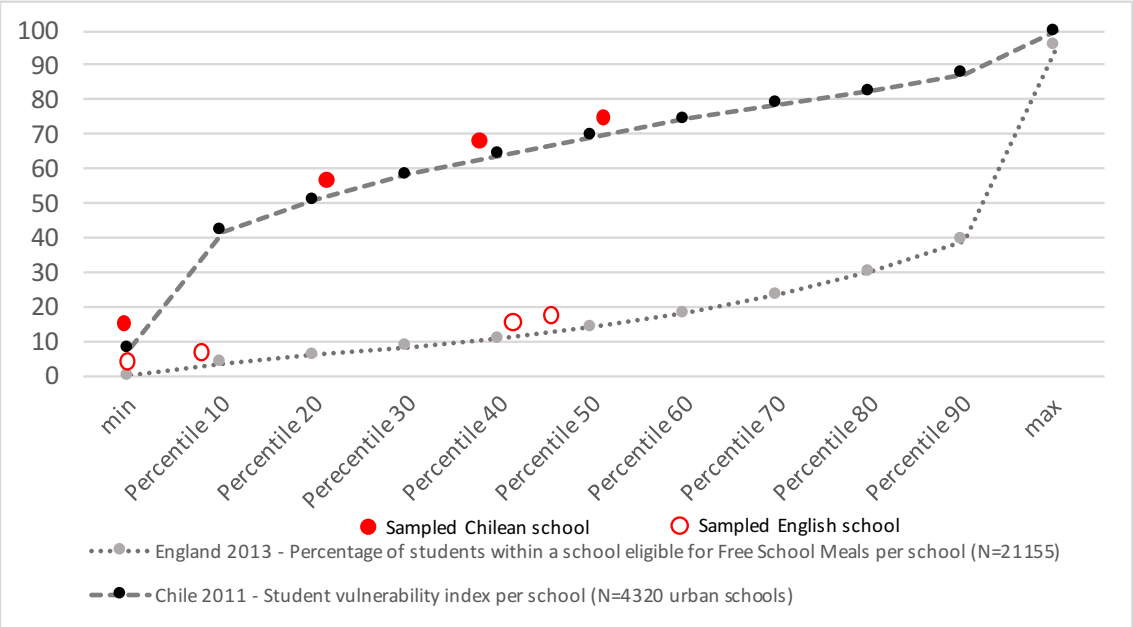
The criterion of authenticity was based on the study of cultural pedagogies by Alexander (2000). The author suggests that when studying educational cultures, it is not relevant to search for representativeness of the studied classrooms or schools, but rather their authenticity within their nation. According to Alexander, because educational culture is generated from, inter alia, joint history, policy, curriculum, assessment and inspection, education cultures powerfully permeate from national levels to thousands of classrooms. Therefore, authentic shared cultural elements must be possible to find in any given classroom setting within a particular country regardless of likely differences between schools. In this sense, for the purposes of this study, any

school following national examinations (i.e. a sort of curriculum de facto) or educating their pupils based on the country curriculum was considered to be authentic within their national context. Experimental schools, or schools following particular pedagogical traditions, such as Montessori or Rudolph Steiner, were therefore not included in the study.

The main theory-guided criterion applied for school selection was that of cultural capital (i.e. parental education) of families. Following results of previous studies reporting the importance of parental education for parental support of students' cognition (A. Carr & Pike, 2012; Duckworth & Sabates, 2005; Stright, Herr, & Neitzel, 2009) and motivation (Y. G. Butler, 2015; Gonzalez-DeHass, Willems, & Holbein, 2005), schools working with students from families of a variety of levels of parental education were sampled and data of parental education was gathered. This allowed the examination of the importance of cultures of education for students' self-regulation and motivational attitudes over and above the (statistically controlled) relevance of parental education for them. Therefore, schools from different socio-economic backgrounds likely to work with parents from varied levels of education were approached. As can be seen from Figure 3.3, sampled schools worked with children considered to come from families of mid to null levels of vulnerability[8] in each country sample (percentile 55 or less).

[8] It is important to consider that the measures of student vulnerability used within each country differ. While the measures used to evaluate the necessity of students to be granted Free School Meals in the UK are based in the extent to which both parents work less than 25 hours a week, contribute to a low household income of no more than 16190 pounds a year, and have limited capital assets (Hobbs & Vignoles, 2010; Kitchen et al., 2013) the measure of student vulnerability in Chile is more comprehensive. The Chilean vulnerability index includes information about children's localities (urban or rural), mother's education, children's delay on starting schooling, and children's health indicators (weight for age, dental cavities, hearing problems) (Kain, Uauy, & Taibo, 2002).

Figure 3.3 Sampled English and Chilean schools socio-economic level (according to percentile of free school meals and vulnerability index) in relation to other schools of same country (higher percentiles indicate higher vulnerability).



Own elaboration from English School Census 2013, and Chilean JUNAEB vulnerability index 2011

Finally, a cross-cultural comparability criterion was applied. Schools included in England were targeted in order to match Chilean schools, as these were sampled first. This led to attempts to match not only the range of relative socio-economic backgrounds of the families with which they worked, but also in terms of their access to state funding (generally linked to being part of national assessments), gender composition and school religiosity. Of the four schools sampled in Chile, three were non religious co-educational state funded schools and one was an all-girls private catholic school.[9] The selection of the religious school was based on the high numbers (15%) of religious schools that can be found in Chile, most of which are privately funded (Madero & Madero, 2012). A "matching" of schools sampled in Chile with those sampled in England was attempted to compare students with similar social compositions across cultures. Therefore, the final English sample included three co-educational state funded schools and one all-girls private catholic school, similar to the Chilean one.

3.3.4. Classroom sampling

The consideration of the diffusion principle was relevant when deciding which classrooms to include in the study. This principle is highly considered in the field of Anthropology and its importance has also been pointed out within cross-cultural psychology (Berry et al., 2002). It refers to how interactions and exchanges between cultures produce cultural diffusions which generate cultural overlaps among different cultural groups. The consideration of this principle

[9] As it was difficult to find a co-educational school of such characteristics willing to participate in the study in Chile, an all-girls school was invited and included as part of the sample.

was important for sampling because, as pointed out by Berry et al. (2002), when studying relationships between culture and psychological processes, high levels of cultural overlap might make it difficult to conclude about the importance of cultural specificities for the individual characteristics of its members. Following the importance of controlling cultural overlaps, only one classroom was invited to participate from each school. This allowed for an interpretation of any differences found between English and Chilean participant as more likely to be due to broader characteristics of the culture of education of each country rather than simply due to particular cultures of the schools in which these classrooms were situated.

3.3.5. Student sampling

The criteria applied for the selection of students were both empirical and theoretical. Both types of criteria were applied for the selection of the age group of participating students. First, a theoretical criterion was applied to decide on whether to include students from early years education, primary school, or secondary school. Primary school age groups were considered to be the most adequate for the study because, as pointed out by Alexander (2000), primary classrooms concentrate more evidence of cultural aspects. According to the author, it is during these years that children are more heavily introduced to aspects of their culture through a socialization process conducted by their teachers. Moreover, to simplify subsequent analysis of an already complex research design, only one age group was included as the focus of study. This particular age group was decided based on an empirical criterion, namely that of the youngest age in which students could respond to the study's interview questions and provide reliable information.

Interview questions required participating students to give information about their own learning motivational beliefs. Declarative knowledge of these types of beliefs has been considered by some as the most abstract type of metacognitive knowledge people might declare (Moschner, Anschuetz, Wernke, & Wagener, 2008).[10] As a consequence, participating students needed to be of an old enough age to be able to declare their own metacognitive knowledge reliably. Following previous research on developmental psychology, 8 year-old students were considered to be the youngest group in which forms of declarative metacognitive knowledge could be studied. This decision was warranted by research showing how young children have been found to be inconsistent in reporting understandings of their own thoughts and behaviours

[10] Please note that Moschner et al. (2008) refer mainly to the declaration of epistemic beliefs. This type of beliefs, together with theories about intelligence and achievement goal orientations (referred to here as achievement motivational attitudes for empirical reasons, see explanation in Section 4.1.2) formed part of the original study. All these beliefs were explored in participating students but due to restrictions of time and writing space, only achievement goal orientations were included as part of the reported final study.

(Perry and Rahim, 2011), with 8 to 10 year-olds being the youngest demonstrating more consistent signs of declarative metacognitive knowledge (Schneider, 2010). Subsequent piloting of the interview questions with a couple of 8 to 9 year-old children proved that at this age they could indeed declare motivational beliefs rather eloquently and consistently.

Six to seven students were sampled from each participating classroom. The selection of these students was based on the principle of maximum variation (Merriam, 2009), as well as an empirical criterion that emerged from the piloting process to ensure richness of the data. As argued by Patton (2002), including a strong variety of cases in a purposeful sample enables the treatment of any emergent pattern as central shared dimensions of a setting or phenomenon. Therefore, students of a wide variety of levels of self-regulation were included in the sample. The inclusion of this within-classroom variety in students' self-regulation helped in understanding the central self-regulatory aspects and motivational beliefs underlying self-regulation related to (and potentially originating from) classroom cultures. In order to ensure such variety, teachers were asked to rate all the students in their class into three levels of independent learning[11] based on a definition[12] of self-regulated learning offered by Pino-Pasternak, Whitebread, and Tolmie (2010). Students considered by their leading teachers as showing evidence of high and low levels of self-regulated learning according to this definition were considered as eligible for the study, and therefore were invited to participate.

Of the students invited (between half and two thirds of the class), and whose parents consented to their participation, six to seven were selected per classroom based on the criterion of friendship. This criterion was purely empirical and aimed to obtain rich data from students' interviews (conducted in pairs) and richer data of students' interactions for learning within their classrooms. The criterion was based on piloting, where quality of interview data was found to be rich when students were paired with friends (see conclusions from piloting phase in Section 3.4.1.1). The level of reciprocal friendship among students from the same classroom was assessed by teachers' nomination of the different children that each of the students were friends with.

Finally, gender balance was considered as a sampling criterion in co-educational schools on the grounds of authenticity (Alexander, 2000). Here, two to four of the participating students would

[11] 'Independent learning' was used as a generic term to replace that of 'self-regulation' during data collection. This replacement was made to avoid teachers tailoring their teaching behaviours for the development of students' self-regulation only for the study, hence keeping classroom data authentic. Teachers were completely debriefed and even introduced to forms of promoting self-regulation in the classroom after the data collection phase was concluded.

[12] The definition of self-regulation (independent learning) used by teachers to assess the self-regulation of their students reads as follows: "*An independent learner uses a varied repertoire of strategies when learning which are used in an appropriate manner assessing the demands of specific tasks. S/he adopts an organized approach towards learning activities, setting learning goals, monitoring performance, and changing strategies when necessary. S/he usually seeks challenge, persists when facing difficulties and interprets difficulties and failures as opportunities for learning".*

be of the same gender. Nevertheless, if there was a tension between the friendship criterion and the gender balance criterion, then in order to gather richer data, priority was given to friendships over gender.

3.3.6. Final sample

The final sample included teachers and 8 to 9 year-old students from four Year 3 classrooms from Chile[13] and four Year 4 classrooms from England. All of these classrooms were situated in different schools working with families from a variety of mid to higher socio-economic backgrounds within each national context. The final group of six students selected from each participating classroom was formed of three students perceived by their teachers as demonstrating high levels of self-regulated learning and three students perceived as demonstrating low levels of self-regulated learning. Each classroom group reflected a balance between male and female students when possible. All the participating students had at least one friend in the sampled group. Information about the age, gender, perceived level of self-regulation and parental levels of education of the sampled students per country can be seen in Table 3.1.

Table 3.1 Characteristics of sampled students per country

Dimension	Chile	England
Age		
Average	9.02	9.11
Standard deviation	0.43	0.23
Gender		
Male	12	12
Female	12	13
Estimated level of self-regulation		
High	12	13
Low	12	12
Level of parental education		
PhD	0	7
Masters	0	2
Undergraduate degree	10	9
Technical post-secondary education	0	3
Secondary education	13	3
Unfinished schooling	1	1
TOTAL	**24**	**25**

Note: If parental education information was available for both parents, the highest level of education of either of them was considered for the study, and therefore reported in this table.

[13] Please note that in Chile, 8 to 9 year-olds attend Year 3 classrooms (in Chile, *Tercero Básico*).

As can be seen from Table 3.1, both samples were similar in terms of age (mean 9.11 and 9.02 years of age, respectively). Country samples were similarly balanced in terms of estimated levels of self-regulation (12 high self-regulated and 12 low self-regulated students in each country) and gender (12 female and 12 male in Chile; 13 female and 12 male in England) of the participating students. In terms of parental education, samples included a wide variety of levels of parental education as intended. In general, students from England showed a higher level of parental education than the Chilean students, with English parents holding more Masters and PhD degrees than Chilean parents, and more Chilean than English parents having achieved secondary education as their highest level of education. Almost all parents from both countries, however, were shown to have finished their respective levels of compulsory schooling (secondary school) or further levels of education (24 and 23 parents from England and Chile, respectively).

Eight teachers participated in the study, one per participating classroom. The sampling of teachers was not purposeful but included those teachers in charge of Literacy lessons within the sampled classroom. The general characteristics of the participating teachers are shown in Table 3.2.

Table 3.2 Characteristics of participating teachers

Country	**Chile**				**England**			
Classroom	**CH1**	**CH2**	**CH3**	**CH4**	**EN1**	**EN2**	**EN3**	**EN4**
Age	48	31	43	40	29	35	26	31
Gender	F	F	F	F	M	M	F	F
Level of education	Masters degree teacher training	Undergraduate teacher training degree	Undergraduate teacher training degree	Undergraduate teacher training degree	Undergraduate degree + PGCE (teacher training)	Undergraduate degree + PGCE (teacher training)	Undergraduate degree + PGCE (teacher training)	Undergraduate degree
Country in which attended schooling	Chile	Chile	Chile	Chile	England	England	England	England
Country in which attended teacher training	Chile	Chile	Chile	Chile	England	England	England	England
Years of teaching experience	23	6	20	13	5	3	2	4
Subjects taught in target classroom	Literacy; History: Science; Social Sciences	Literacy and all other subjects, except for PE and Religion	Literacy; Sicence	Literacy	Literacy and all other subjects	Literacy and all other subjects	Literacy and all other subjects	Literacy; Maths; Art; Social Sciences

As can be seen from Table 3.2, all participating teachers were educated and trained in the respective countries in which they taught. They all had university degrees, with almost all having attended teacher training programmes. Teachers from each country sample differed, however, in terms of years of experience, with Chilean teachers having much more experience (6 to 23 years) than English teachers (2 to 5 years). Moreover, unlike Chile, in England not all teachers were female; two of them were male.

Finally, the degree of involvement of the participating teachers in the education of the sampled students differed across classrooms. All of them taught Literacy in the participating classrooms, but only some of them taught all other subjects. In general, English teachers tended to teach most of the subjects of the curriculum in the studied classrooms, whereas in Chile it was more

common for teachers to teach only some of the subjects. This reflected trends of allocation and distribution of teaching resources in each studied country, thus little could be done to make country samples comparable in this sense. Therefore, it is important to note that the different levels of involvement of the participating teachers in the education of the sampled students might entail some misestimation of the relevance of teacher talk sustaining classroom cultures over students' self-regulation. Such estimation could be much more accurate if the same teacher taught all subjects to the participating students across all classroom cases.

3.4. Methods and data collection procedures

The same protocol was followed for data collection in each participating classroom. Two weeks were spent in each classroom for data collection. During the first week, the researcher worked as a teaching assistant, with formal data collection taking place from the end of the first week to the end of the second week. Table 3.3 shows an overview of the different research questions of the study and the different types of data collected during these two weeks in order to answer them.

Table 3.3 Research questions and the type of data and analytical techniques used to answer them

Research aims and questions	Method of data collection	Technique applied for primary data analysis	Statistical technique applied to answer R.Q.
Aim 1: To understand the role that culture might have in students' self-regulatory practices in terms of levels and functions.			
R.Q.1. Do the self-regulatory behaviours and related levels of task achievement of 8 yo 9 year-old Chilean and English students vary in extent across countries? If yes, how?	Cube assembly tasks	Behavioural analysis	Mann-Whitney U
R.Q.2: Do the self-regulatory behaviours of Chilean and English 8 to 9 year-old students differ in the underlying self-regulatory factors (processes) they represent? If yes, how?	Cube assembly tasks	Behavioural analysis	Factor analysis - (exploratory and confirmatory)
R.Q.3. Do the same specific self-regulatory behaviours relate to levels of task achievement in both Chilean and English 8 to 9 year-old students? If not, which ones are most related to task achievement in each group?	Cube assembly tasks	Behavioural analysis	Multinomial regressions
Aim 2: To understand the role of culture in the levels and function of students' achievement motivational attitudes underlying self-regulation.			
R.Q.4. Are there any differences between Chilean and English 8 to 9 year-old students in the achievement motivational attitudes they tend to adopt? If yes, how do they differ?	Interviews	Thematic analysis and coding of themes	Mann-Whitney U
R.Q.5. Does the way that achievement motivational attitudes predict effort in Chilean and English 8 to 9 year-olds differ? If yes, how?	Interviews + Cube assembly tasks	Thematic analysis and coding of themes + Behavioural analysis	Multinomial regressions
R.Q.6. How and to what extent does the motivational role of achievement motivational attitudes in self-regulatory behaviours vary between Chilean and English 8 to 9 year-old students?	Interviews + Cube assembly tasks	Thematic analysis and coding of themes + Behaviour analysis	Multinomial regressions
Aim 3: To understand the importance of classroom cultures for students' self-regulation, and the specific effects of motivational and cognitive characteristics of teacher talk sustaining such cultures			
R.Q.7. What is the relevance of classrooms, and the cognitive culture sustained within them by teacher 'regulatory talk', for students' self-regulatory behaviours?	Filming of classroom lesson + Cube assembly tasks	Sociocultural discourse analysis + Behavioural analysis	Multilevel regressions and analysis of variance
R.Q.8. What is the relevance of classroom motivation culture sustained by teachers through 'socio-motivational talk' for students' self-regulatory behaviours?	Filming of classroom lesson + Cube assembly tasks	Sociocultural discourse analysis + Behavioural analysis	Multilevel regressions

In order to check the adequacy of the data collection methods and decide on the most appropriate subject for conducting the filming of lessons (either Literacy or Mathematics), methods of data collection were piloted in two different Year 4 classrooms situated in the same English school. The conclusions derived from this piloting process are reported in the following section.

3.4.1. Pilot study

A pilot study was conducted in order to test the adequacy of the research design and data collection tools, as well as to estimate an appropriate length of the data collection period. The pilot study involved spending two weeks between two Year 4 classrooms in an English primary school. During these two weeks, the researcher acted as a teaching assistant, observed and recorded several literacy and numeracy lessons, tested the adequacy of the task considered to measure the self-regulation of 8 to 9 year-olds and the interview questions designed to study motivational beliefs in this year group. The pilot was conducted as if it were the final data collection. In addition to this, the researcher requested some classroom videos from the Chilean Ministry of Education in order to simulate a comparative process between the two countries and better plan the final ways of conducting comparative data analysis. Throughout this section, only the lessons learned from this process are mentioned. A full report of the activities carried out during the pilot study can be found in Appendix 7.

3.4.1.1. Conclusions derived from the pilot study

There were several implications for research deisgn and methods that arose as a result of conducting the pilot study. Decision were taken on several sampling criteria, as well as on new variables to be included and adjustments to the research methods for the final data collection. In relation to sampling, it was decided that the study was going to focus on primary Literacy lessons rather than Maths lessons. As expected, the content of Maths lessons was found to be very similar across the Chilean and English lessons. In both contexts, Maths lessons focused strongly on content matters and teachers were more likely to fall into a right/wrong judgment of students' mathematical knowledge/performance. This affordance, provided by the nature of mathematical knowledge over the ways of teaching mathematical content, was considered to make the overlap of cultures of education across countries more likely. Therefore, in accordance with the principle of cultural diffusion (Berry et al., 2002), this subject was considered to be less appropriate for a cross-cultural enquiry connecting the social and individual spheres.

In contrast, Literacy lessons were found to include more culturally relevant activities, such as commenting on book chapters that had some level of relevance to each cultural context, learning about legends and finding out ways of writing or representing stories in culturally appropriate forms. The diversity of contents and activities in which students engaged across countries to

develop Literacy skills rendered the subject of Literacy a more appealing medium for a cultural enquiry. Such a diversity of approaches to develop students' reading and writing literacy skills across classrooms was considered to be more appropriate for finding differences in teaching both across and within country samples. This was considered to be beneficial for exploring the importance of both national and classroom cultures of education over self-regulation and motivational attitudes.

Furthermore, the inclusion of one classroom per school rather than two or more was further supported by the piloting experience. Even thought important differences were found between the two Year 4 teachers participating in the pilot study within the same school, important similarities were also evident. These similarities were apparent in terms of the shared educational ethos concerning, for example, teachers' promotion of interpersonal respect of ideas, high expectations of students' achievements, or the high value of peer discussion to foster individual comprehension. As these were considered to be relevant elements for the promotion of self-regulation or achievement goal orientations, it was decided to include only one classroom per school. As mentioned before, this helped in interpreting any cross-cultural difference in self-regulation or motivational attitudes as originating from differences between country rather than school cultures of education.

New variables were also included as a result of the pilot study. In particular, piloting led to the inclusion of students' motivational beliefs in the study. Originally, only the importance of motivational cultures (as studied through the observation of evidence of motivation classroom structures) over students' self-regulation formed part of the study. During piloting, however, it became apparent that in order to better understand the role of culture in students' self-regulation it was important to consider the role that cultures might be having over students' motivational beliefs underlying self-regulation. This was considered to be in accordance with the multidimensionality of self-regulation, in which both motivation and cognition play an important role (Whitebread & Pino-Pasternak, 2010). Also, research suggesting the relative independence of students' perceived classroom goal structures and their own personal goal orientations (Wolters, 2004) support the empirical and theoretical necessity of studying these two not only at the level of the classroom but also at the level of the students.

The pilot study also helped to determine whether the trialled research methods were adequate for the purposes of the study. In general, all the techniques of data collection applied were considered to be appropriate, with only minor adjustments required. Whole classroom video data proved to be an appropriate way for the systematic research of teacher-student interactions. Some technical difficulties regarding the audio of these videos were possible to detect and alternative ways of accessing teacher-student talk in very loud classroom environments were tested with success. Student interviews were successfully piloted, with both the questions and the interactive format of the peer interview piloted, providing very rich data.

Tasks for the assessment of students' self-regulatory behaviours were also piloted with success. The piloting, however, provided insights regarding the difficulty of the set of tasks, which needed to increase slightly in order to provide higher challenge to some students for whom the piloted tasks seemed not to demand high levels of self-regulation. As a consequence, one more difficult task was added to the original set of cube assembly tasks to increase the overall level of difficulty.

Finally, following the pilot study, the data collection time frame was considered to be adequate for the data collection of one classroom but not two. Using the first week as a period of acclimatization seemed to be productive for gathering authentic and rich data during the second week. The first week allowed the researcher to reassure teachers about the anonymity and confidentiality of any data collected, and students to feel comfortable and become familiar with the presence of the researcher. The building of a good research rapport with the participants has been considered by other researchers of culture as crucial for building trust and securing access to data that is authentic (Rogoff, 2003). The concern about the authenticity of data seemed to be especially relevant in relation to filmed lessons given the previous experiences of researchers such as Robin Alexander (2000) who had difficulties in asserting how genuine a filmed lesson could be.[14] The first week helped in the assessment of the authenticity of lessons filmed during week two. A whole week was considered to be optimal for conducting student interviews, get students to complete the cube assembly tasks, and film three Literacy lessons. This period provided enough time and flexibility to allow teachers to judge when a particular child could miss a lesson or part of a lesson in order to carry out the activities for the study without lagging behind in his/her learning.[15] The particular procedures followed for data collection during these two weeks are reported in the following section.

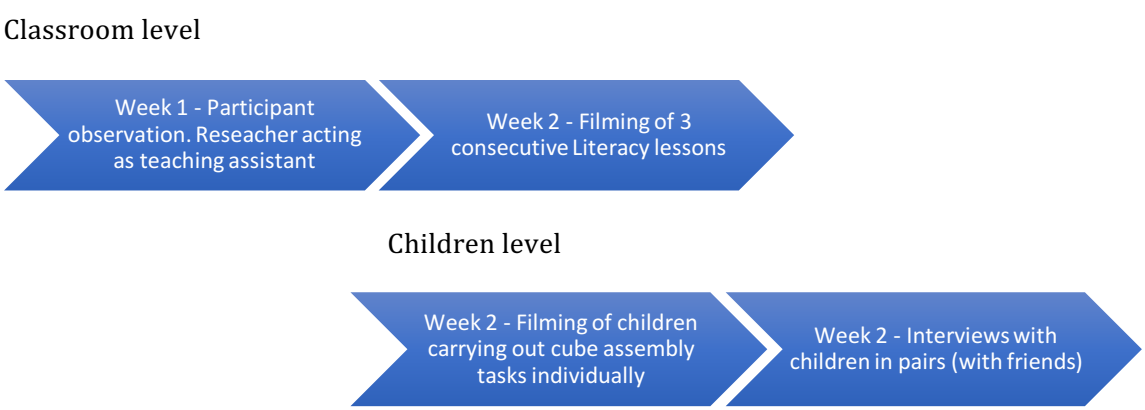
[14] In his study of five cultures reported in *Culture and Pedagogy*, Robin Alexander reported not to have the possibility of having this period of acclimatization. One of the consequences of not having such a period within his study was the impossibility to judge the authenticity of the lessons filmed. This problem was particularly salient in his study of Russian classrooms. The teaching in Russian classrooms seemed to follow a certain type of script which was very similar among the different participating classrooms, generating concerns about the authenticity of such data. This was especially problematic in his case, given that each of his visits to the researched classroom was followed by a delegation of Russian education authorities. Consequently, Alexander decided to collect the Russian data again, but this time making sure no authorities accompanied him. However, after all this effort and investment of time and funds, the author realised that the teaching originally observed in the first group of participating Russian primary classroom was in fact authentic.

[15] Parents gave their informed consent for children to be absent from their regular classroom lessons for approximately 1.5 hours in total (see ethics consideration in Section 3.5). Teachers generally preferred children to be absent in lessons such as PE, Religion or Music (when there were such subjects), as well as other types of lessons where children were engaging in particular activities which allowed them to get back up to speed after re-joining the class. The researcher accommodated the different criteria each school considered as best suited for students to be absent from regular lessons. School breaks or any other subject/activity that students reported to enjoy were not used as opportunities for data collection.

3.4.2. Final data collection methods and procedures

Formal data collection took place during the second week of fieldwork in each classroom. This included the collection of data for the analysis of students' self-regulation, students' achievement goal orientations, as well as cultures of education of Chilean and English participating classroom. Evidence of student self-regulation was gathered through observational methods, namely through the video of students' self-regulatory activity while carrying out a series of cube assembly tasks. Students' motivational beliefs were studied through interviews. Finally, characteristics about cultures of education of the participating classrooms were collected by filming a series of three consecutive Literacy lessons in each of them. The rationales followed for the selection of these methods of data collection are presented in the subsequent sections.

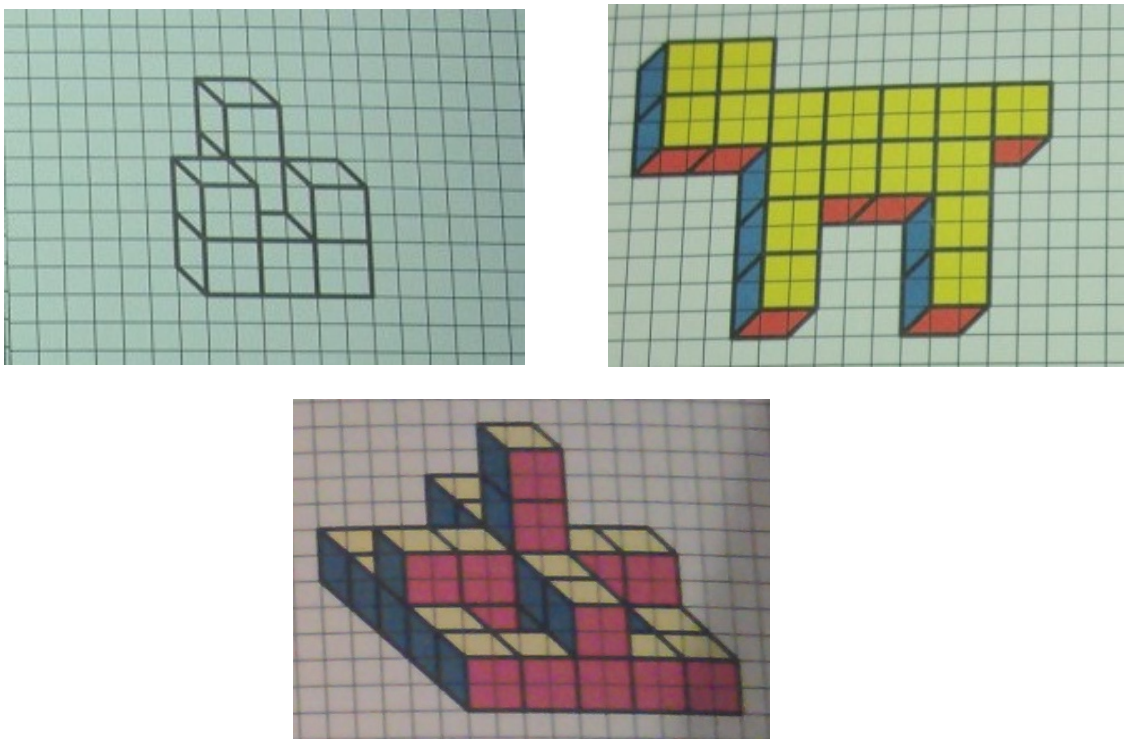
Figure 3.4. Stages of data collection



3.4.2.1. Methods and procedures for measuring children's self-regulation

Students' self-regulation was studied through observational methods. Students were filmed while conducting a series of 11 to 13 different cube assembly tasks of varied levels of difficulty. Examples of the variety of tasks students carried out can be seen in Figure 3.5 (see all tasks in Appendix 1). For each task, students were required to replicate a target model by assembling up to 40 tricolour cubes. Tasks were assigned in the same order for all participating children, from less to more complex models in terms of size, colour and figure. Students were also told that all figures could be built exactly as depicted in the card models.

Figure 3.5 Examples of target models built by participants (different difficulty levels)



Students' behaviours were rated from the video-recording using a series of behavioural observation subscales adapted and expanded from the SBOS scale developed by Dermitzaki, Leondari, and Goudas (2009) to study 7 to 8 year-olds self-regulation (see the process of further development and adaptation of this scale in Section 4.1.1.1, next chapter, and the finally applied scale in Appendix 4). The use of observation rather than self-report techniques was considered to be especially appropriate for the measurement of self-regulation in children. As has been pointed out by previous research, children have limited language for expressing themselves in terms of metacognition and self-regulation; they usually show a positive response bias, and confuse their intentions with their real actions (Perry & Rahim, 2011). All these problems made the use of self-reports and even think-aloud methodologies, advocated by other researchers (Greene, Robertson, & Costa, 2011), questionable for the research of children self-regulation. These methods rely on the participants' verbal abilities and consciousness of learning skills, which are still under development at young ages. Observational methods have been considered to be good alternatives to study children self-regulation because they do not rely on the participants' verbal abilities and consciousness of their own learning skills to estimate metacognitive abilities underlying self-regulation, subsequently avoiding their underestimation (Bryce & Whitebread, 2012). As a consequence, these methods were applied because they allowed children to paint a more accurate picture of their own self-regulation (Moschner et al., 2008).

Furthermore, individual tasks were considered to be more appropriate than peer or group tasks to study children's self-regulation for empirical reasons. Individual tasks were considered to be able to overcome the difficulties of differentiating between self-regulation, co-regulation and shared-regulation in the data. This was especially relevant considering the interdependence of regulatory activity among people in interactive situations (Järvelä, Volet, & Järvenoja, 2010).

Moreover, based on previous research, there was an interest in making tasks challenging for students. As asserted by Perry and Winne (2013), self-regulatory processes are mostly required by people when facing difficulties. Therefore, in order to determine a more accurate level of self-regulatory processes in students, some features were introduced to make tasks more challenging compared to the original cohort of 7 to 8 year-olds researched by Dermitzaki et al. (2009). Thus, children were asked to assemble the figures as fast and as accurately as possible, giving priority to accuracy over speed. Additionally, one extra task considered to be more complex than the ones used by the SBOS authors when developing the original scale for younger children was included. In order to make students feel comfortable, and taking their wellbeing into consideration, they were reminded that the main objective of conducting this activity was to learn from the ways they assembled the models (i.e. self-regulatory behaviours), and that the accuracy with which they assembled the figure was only secondary. Students could stop carrying out a particular task or withdraw from the activity at any time if they wanted, and they were reminded of this option if they showed signs of frustration. They were also reassured through the whole process that they were doing a good job and that the way they were building the figures was indeed very interesting.

Finally, by video-recording the engagement of the participating students in the individual cube assembly tasks, a higher degree of validity could be reached due to the possibility of repeating and sharing the viewing and analysis of the recorded activity for academic discussion (Whitebread et al., 2009). Video recording also allow for an application of more varied analytical perspectives which could lead to the generation or expansion of theories (Derry, 2007). This was in line with the theory building exercise this thesis attempts by including a cultural dimension to the understanding of self-regulation and motivational attitudes. This approach proved to be relevant, for example, by allowing the inclusion of new observational subscales to the original SBOS scale in accordance with some observed cultural specificities (Section 4.1.1.1.1).

3.4.2.2. Methods and procedures for the study of children's goal orientations

Students achievement goal orientations were studied through interviews which were conducted in pairs of friends to make students feel more comfortable, and lasted between 20 and 30 minutes. This procedure was followed considering that children might feel intimidated when interviewed by adults and perceive the interview situation as a test, providing answers that may be elaborated with the simple aim to please the adult, whom they see as an authority (Morrison,

2013). The inclusion of friends into the interview situation allowed for an overcoming of both problems (i.e. being uncomfortable and providing unreliable answers). As has been pointed out by Morrison (2013), interviewing children together with other friends can ease discomfort, making the situation feel less like a test for them. To ensure children did not perceive the situation as a test, in line with Morrison's suggestions, children were also reminded that there were no correct or incorrect answers and that the interview simply aimed at understanding their perspectives and experiences.

Students were asked four questions in relation to their achievement goal orientations. An example of one of these questions was *How much do you like competing or comparing yourself to others? Why?* A full list and the rationale behind the elaboration of these questions can be found in the next chapter on data analysis (see section 4.1.2), where an analysis of the influence of interview questions over the themes found in students' answers is offered. Questions were addressed to each student separately, giving them their own turn to answer. When children tended to agree with what their friend had said they were asked to elaborate on why they agreed using their own words and referring to their own experiences. This allowed for accessing the differential motives driving the similar orientations found among friends. When it was difficult to understand the children's answer, they were asked to offer clarification explaining themselves further. If an idea was not possible to be understood after their further explanations, then the researcher offered his own understanding of the answers to the students, who would evaluate the accuracy of his interpretation and explain again if necessary.

Interviews were preferred to questionnaires – traditionally used to explore achievement goal orientations in adolescents and older students (e.g., Middleton and Midgley, 1997; Polychroni, Hatzichristou, and Sideridis, 2012) – due to an interest in understanding the motives driving students' achievement goal orientations based on research suggesting the importance of culture over motives driving students achievement (e.g., Liem, Martin, Porter, and Colmar, 2012). Questionnaires have been said to limit the exploration of reasons behind students' orientation towards specific goals (see Urdan and Mestas, 2006), whereas more open ended methods such as interviews have been said to allow students to provide open descriptions of their goals, and therefore provide a more realistic picture (Dowson & McInerney, 2003; Horowitz, 2010).

Interviews have been successfully used for the research of students' goal orientations (Dowson & McInerney, 2003; Järvelä & Salovaara, 2004). Some examples of interview questions used by Dowson and McInerney (2003) which deliberately pursued the aim of researching achievement goal orientations in middle-school students were: "*Some students say that they want to achieve in school to please their parents and because they like their school work. Is this true of you? Why?*", *"Are you motivated to do well at school because you want to get good marks? Why/Why not?*". The final questions were similar to these somewhat less open-ended questions and were based on what the literature has identified as mastery and performance orientations. The questions

(which can be found in Section 4.1.2.1) explored general attitudes towards mastery (effort investment, challenge approach and interest in learning from errors) and performance (interest in over-performing others or demonstrating good performance) in achievement situations that were important for the children themselves (either within or outside the academic realm and even the classroom). The interview questions were piloted with success, ensuring their comprehensibility by 8 to 9 year-olds.

Moreover, the application of semi-structured interviews was based on the need to make interviews comparable (Cohen et al., 2011). Comparability among interviews was important in order to draw conclusions about similarities and differences across country samples. Follow up questions tailored to students' answers were included to clarify students' ideas ensuring a fair representation of their thinking in subsequent analysis (Silverman, 1993).

3.4.2.3. Methods for the study of classroom cultures

The culture of education was studied by filming a series of three consecutive Literacy lessons (around 180 minutes) under naturalistic conditions and towards the end of the school year in each of the Chilean and English participating classrooms. No special instructions or materials were given to teachers to conduct the filmed lessons. Two microphones were used during recording: one captured the general audio at the level of the whole classroom, while the other, an individual radio-mic worn by teachers, captured teachers talk to the class, groups or individual students.

Classroom video-recordings have been used as a core type of data for the study of classroom cultures in the last few decades (e.g., Allard and Cooper, 2001; De Corte and Verschaffel, 2007; Depaepe, De Corte, and Verschaffel, 2007; Mitchell and Lee, 2003; Staub, 2007; Stigler and Perry, 1990; Wood, Williams, and McNeal, 2006). Particularly, and in line with the research of teacher-student communication promoting students self-regulation and motivation for learning, classroom communication has been considered to provide information about educational values, norms, beliefs and practices, all defining characteristics of classroom cultures (Staub, 2007). By extension, observation analysis of classroom cultures has also been used to study national/ethnic cultures of education (Alexander, 2000; Andrews, 2009; Rogoff, 2003; Stigler & Perry, 1988) and to understand the importance of such cultures in human development and learning (Forman, Minick, & Stone, 1993; Wood et al., 2006).

The use of classroom video-recoding has also allowed us to overcome recent concerns about the validity and low predictability of individual behaviour from quantitative measures (surveys) of cultural values (see Chan, 2009; Watkins, 2010). Moreover, this method allowed for gaining

access to educational values communicated in the classroom not only explicitly (Planel, 1997)[16] but also implicitly. Implicit communications included aspects such as the way a teacher responded to student dependency-oriented (maladaptive) help-seeking (Newman, 2002; Stodolsky, 1988). For example, by teachers telling a student the 'right answer' rather than helping a student find the answer, or valuing final products (performance) rather than the process of learning (mastery) (see analytical tools applied in Section 4.1.3.2.2). The study of both explicit and implicit ways of communicating cultural aspects is thought to be key when aiming to determine the predictive power of classroom cultural values over students' psychological aspects (Depaepe et al., 2007).

Lesson video-recording has also been used as a core method for the research of the role of social contexts in the promotion of self-regulation. It has been widely used for understanding the role of adult-child interactions in the mediation of children/students development of self-regulatory skills (Díaz, Neal, & Amaya-Williams, 1990; Gallimore & Tharp, 1990; A. Hadwin et al., 2011; Wertsch, 1979a; Whitebread, Mercer, Howe, & Tolmie, 2013). It provides access to discourse and communicative transactions scaffolding and affording regulatory activity in ways that are instrumental for the development of individuals' self-regulation (Hadwin, Järvelä, and Miller, 2011).

Similarly, the promotion of motivation for learning has also been studied through the observation of classrooms. This method has been used for the study of classroom goal structures (Ames, 1992) and of the ways in which those structures may be related to students' adoption of achievement goals (Stipek et al., 1998), avoidance strategies (Turner et al., 2002), help-seeking (Linnenbrink, 2005) and other motivational aspects underlying motivation for self-regulation (Walker, Pressick-Kilborn, Arnold, and Sainsbury, 2004). Of particular relevance are the studies of Julianne Turner and colleagues (Turner et al., 1998, 2002, 2003). These studies rely on transcriptions of classroom talk supported with classroom activity descriptions and code instances of whole-class discussions. All these, together with the fact that the use of observations has been regarded as enhancing the ecological validity of the data (Perry & Rahim, 2011; Wolters, Benzon, & Arroyo-Giner, 2011), especially if collected under naturalistic conditions (Hitchcock & Hughes, 1995), made it the most appropriate approach for this cultural enquiry. Furthermore, the decision to record three consecutive lessons was based on Mercer's (2004) suggestion that in order to better understand the meanings and functions of classroom

[16] Planel (1997) found that teacher discourse in different countries could allow access to the educational values of the country. For example, she found teachers' utterances to be illustrative of valuing students' development of abstract thinking in the case of French primary education (e.g., Teacher: '*there is a logical order of development. We>>> just to check are the result of some sort of logic…order*') and empirical thinking in the case of English primary education (e.g., Teacher: '*you've got to think about that…everybody's ideas would be different*') (p.357).

communication, interactions need to be contextualised within previous communications. Finally, lessons were filmed towards the end of the school year in order to gain access to well established classroom cultures. This made it more likely to find predictive effects of teacher talk on students' self-regulation in case these actually existed.

In the next and final part of this chapter, the procedures followed to ensure that the methods described previously did not have any negative consequences for participants and institutions involved in the study are reported.

3.5. Research ethics

It is important to consider the specific ethical issues raised within the study. In line with the ethics guidelines from the British Educational Research Association (2011), it was anticipated that the most pressing issues would concern the informed consent and voluntary involvement of the participants, the protection of their personal wellbeing, and the maintaining of the confidentiality of the information gathered. Information sheets and consent forms were sent to the parents/caregivers of children invited to take active part in the study (see Appendix 2.1, 2.2, and 2.3). The forms included information about the aim of the study and the type of involvement that participating children would have in terms of activities and time. The forms also included information about data confidentiality and anonymity of participants within and outside the context of the participating school. They included specifics about how the data would be stored, who would have access to it or be able to see excerpts, and under which circumstances.

In line with the ethical guidelines, the parents and caregivers of participating children were assured of the anonymity and confidentiality of the information collected from their children. Parents and caregivers of participating children granted permission for the use of any audio or video-recording (or their transcriptions) for academic purposes. Parents allowed the researcher to show excerpts of the data to other researchers or professionals, but only for purposes pertaining to research dissemination and the promotion of children's 'learning to learn' skills (e.g., through workshops). Participating students could withdraw from the study at any time, with parents or caregivers not required to give any explanation. Data was stored in a secured place with the assurance that it would be destroyed after its use, in line with the regulations of the University of Cambridge[17]. Parents and caregivers of children that only participated in the video-recorded Literacy lessons were informed of the study and had the option of blurring the image of their child's face in the recording, so that no one outside the research team could identify them.

[17] Good research practice guidelines state data should be kept for a minimum of 10 years from project completion (see http://www.research-integrity.admin.cam.ac.uk/sites/www.research-integrity.admin.cam.ac.uk/files/good_research_practice_guidelines_11.14.pdf).

Similarly to parents and caregivers, participating teachers were also given information about the aim of the study, what their own and their students' participation would involve, as well as similar assurances regarding anonymity, confidentiality, data management and use, and their permanent right of withdrawal from the study (see Appendix 2.4 and 2.5). In addition, given that classroom observations are generally used as ways of assessing teaching quality, teachers were also assured that special care would be taken of the collected data so that their participation would not have any unintended negative consequences for them. This was included as part of their consent forms and will continue to be safeguarded by not sharing any information or using video-clip examples from their practices at any conferences or workshops taking place within their own school or city (unless the teacher consents to this by giving explicit instructions in writing).

A few ethical issues had to be considered in relation to the participating teachers and students during the study. Regarding the students, special care had to be taken in order to ensure that their academic confidence was not damaged due to their participation. At times, certain cube assembly tasks proved to be challenging for students. While this was desirable from a methodological point of view, for gaining stronger insights into the participating students' self-regulation (mainly exerted when facing difficulties), these challenges could have positive or negative consequences on the students' self-efficacy depending on the outcomes. In order to protect students' self-efficacy, they were reminded that the main objective of the task was to understand how they approached the tasks and not the outcome as such. In addition, students were told that some tasks were especially selected with the intension of being difficult for children their age and, hence, it was likely that they could not solve all of them. Students were also reminded that they could move on to the next task whenever they wanted, allowing them to manage their own motivational processes. Also, if the researcher judged that the tasks were proving to be too difficult for a student, then the final most difficult cube assembly models were not applied. In these cases, children carried out 11 instead of 13 models. As children were told from the outset that the task consisted of around 10 models, the concealment of the existence of the last model was considered to protect rather than damage their self-confidence.

In relation to this, it is important to assert that while some tasks were expected to present children with mild levels of challenge, they were not expected to be impossible for 8 to 9 year-old children to assemble and only on very few occasions children were found to be disengaged from the task due to its difficulty.[18] Student interviews were also conducted keeping in mind the protection of the children's self-efficacy, by making sure that they did not perceive the situation

[18] According to the final coding data base, of the over 636 times the participating children engaged in cube assembly tasks, they were found to face high levels of challenges (i.e. level 4 out of 4) and reaching low levels of achievement (level 1 or 2 out of 4) in 78 occasions. Of these, however, students showed clear signs of motivational disengagement (level 1 or 2 out of 4) only in 3 occasions.

as a test and that they understood that there were no correct or incorrect answers. To make their participation enjoyable, neither cube assembly tasks nor interviews were conducted during a school time they seemed to enjoy, such as break times, particular classroom activities, or subjects they preferred not to miss. To minimize possible learning effects of students missing classes when carrying out the research activities (1,5 hours in total), teachers were asked to advise on when would be better to take children out of class.

In relation to the teachers, a particular situation for ethical consideration arose. One of the participating teachers asked the researcher if it would be possible to have a copy of one of the Literacy lessons filmed to show parents how badly some of the children behaved. The teacher had to be reminded that parents had given permission to film their children in the classroom for the purposes of this research and for the promotion of children 'learning to learn' skills and that, therefore, the recorded lessons could not be used for any other purposes. This decision was taken in order to avoid an unintended negative consequence that the research could have had for some of the participating students. The teacher understood and accepted the explanation as valid, therefore the issue was not raised further.

In general, the methods reviewed in this chapter suggest the best way to approach a comparative study aiming to understand the relationship between culture and psychological aspects are methods able to produce open-ended qualitative data. Also, considering the interest in studying the relevance of culture for children, self-regulation seemed to be best studied through observational methods; and motivational attitudes through semi-structured interviews conducted in pairs. Furthermore, the literature indicates that the best way to study classroom cultures is through observational methods as well, especially through the video recording of naturalistic lessons. Video and audio recordings also were considered essential so analysis could be tailored to the data as well as done as many times as needed to ensure its reliability. In the next chapter, the analytical tools and measures applied and developed to analyse the data collected are introduced.

4. DEVELOPMENT OF ANALYTICAL TOOLS AND DATA PREPARATION

The main purpose of this chapter is to present the research tools developed and applied for the analysis of students' self-regulation, students' achievement motivational attitudes, and teacher talk in the classroom. All these analytical tools were applied for the codification and categorisation of qualitative data in order to allow subsequent quantitative analyses. Therefore, a second aim of this chapter is to report on the procedures followed to prepare the data for quantitative analysis, such as the checking of the statistical assumptions of the techniques applied to obtain the final results that are presented in the subsequent chapters. The chapter is divided in two sections, each addressing one of these aims. In the first section the development of the analytical tools is reported.

4.1. Analytical tools: Development and application

In this section, the analytical tools used to code and categorise students' self-regulation, students' achievement motivational attitudes, and teacher talk between in the classrooms are presented in separate subsections. Most of these coding schemes and behaviour observation scales were specially developed or adapted for the purposes of this study. Therefore, each respective subsection offers an account of the way the development and adaptation of these tools progressed from relevant theoretical categories to empirical analytical categories that it was possible to reliably identify in the data. Additionally, for every type of analytical tool, their analytical purpose, chosen unit of analysis, the analytical procedures followed, levels of reliability, and examples of application are reported

4.1.1. Coding and categorising students' self-regulation

As has been stated in previous chapters, the study of self-regulation was conducted in order to explore the role that education cultures may have in it. The first purpose of measuring students' self-regulation was to understand if different cultures led to the development of different self-regulatory behavioural strategies. The second purpose of analysing it was to explore if these different self-regulatory behavioural strategies could be regarded as representing similar or different psychological dimensions of self-regulation across cultures. Finally, the third purpose was to determine if these different ways of self-regulating were similarly or differently productive in relation to effort and achievement (here also referred as pragmatic functionality) across cultures. In order to address these different objectives, a single measure of self-regulation

was not considered to be appropriate. Rather, to achieve the objectives, it was important to find a form of measuring multiple ways in which students could self-regulate. The SBOS scale was considered to be a good option for this enterprise. The process undertaken to assess its adequacy and undertake any needed adaptation and expansion is presented next.

4.1.1.1. Applied observational scale

The Strategic Behaviour Observation Scale (SBOS) by Dermitzaki, Leondari, and Goudas (2009) was considered to be a good fit for purpose, as it allowed for measuring the extent to which children made use of a variety of 12 different types of observable behaviours for the purposes of self-regulation (see scale in Appendix 3). For each type of behaviour the SBOS described 4 levels of attainment, with 1 describing the poorest level and 4 the highest level of observed quality or frequency of the measured behaviour. Many changes, exclusions and inclusions of scales had to be carried out before arriving at the version finally applied. Within this subsection, the original SBOS is presented followed by the different criteria that led to the adaptation and creation of subscales that formed part of what will be referred to here as the Self-regulatory Behaviour Observation Scale (SBOS) II. The SBOS II is presented, and some examples of the decisions leading to the final version of the adapted scale are offered.

4.1.1.1.1. Original scale before adaptation and development

The following lists show all the behaviours originally considered as part of this scale. Many of the SBOS subscales had to be adapted or excluded for this study for reasons that will be explained shortly. Table 4.1 shows which original SBOS subscales were used in their original version, which ones were adapted, and which ones were simply not applied.

Table 4.1 SBOS subscales applied and adapted

SBOS Subscale	Used as in original	Adapted	Applied
Cognitive strategic behaviour			
1. Choosing between main and trivial elements			No
2. Analysing and combining activities			No
3. Effective use of models		Yes	
Metacognitive Strategic behaviours			
4. Planning [or building order]	Yes		
5. Monitoring		Yes	
6. Awareness of errors	Yes		
7. Learning from errors	Yes		
Motivational/Volitional behaviours			
8. Persisting		Yes	
9. Working autonomously		Yes	
10. Maintaining motivation	Yes		
11. Initiative – activation			No
12. Concentration	Yes		

Overall, of all the SBOS behavioural observation subscales, only 5 were used in their original versions, 4 were adapted, and 3 excluded. The criteria followed to decide whether to use, adapt or exclude these subscales from the study were based on criterions of validity and measurement reliability. Specifically, the SBOS subscales were revised in relation to the face validity of their descriptions to fit within the construct of self-regulation as theoretically defined by the 'monitoring and control' model proposed by Nelson and Narens (1990). The subscales were also examined in terms of their level of fit for purpose (i.e. use validity), considered to be a fundamental characteristic of any valid research tool (Newton & Shaw, 2014). The specific criteria used as part of these validity and reliability checks are presented as follows. First, decisions related to fit for purpose are presented, then those related to construct (face) validity, and finally those regarding measurement reliability are indicated.

4.1.1.1.2. Examination of SBOS subscales' fit for purpose

The examination of the fit for purpose of the SBOS subscales was carried out taking as a point of reference the research questions the scales were going to help to answer. For instance, given that the measurement of different self-regulatory behaviours had the purpose of concluding whether particular self-regulatory behaviours would i) predict task achievement in similar or different ways across country samples, and ii) represent similar or different psychological dimensions of self-regulation across country samples, then the SBOS had to be revised in order to:

- *Ensure that measured self-regulatory behaviours (independent variables) differed from a measure of task achievement (dependent variable).* If this was achieved, then any

subsequently found predictive relationship between self-regulation and task achievement could be considered not to be due to measurement confusion. In particular, in the case of the analysis of the cube assembly tasks, this meant ensuring good levels of differentiation in the subscales between actions such as placing a cube in the right position and achieving such a position due to self-regulation.

- *Ensure that measured self-regulatory behaviours were different among themselves.* This was given special consideration in order to avoid finding correlations between self-regulatory behaviours simply due to measurement overlaps between subscales. This was particularly important for the interpretation of Factor Analysis applied to determine similarities and differences across country samples in terms of the psychological dimensions different self-regulatory behaviours represented.

As a result of the efforts to differentiate between self-regulatory behaviours and task achievement, many subscale descriptions referring to students' successful placement of cubes had to be removed. For example, the subscale observing the extent to which children 'chose between main and trivial elements' of the model when building had to be excluded. The reason for this exclusion was the difficulty of differentiating between what could be considered as observing children choosing main elements of the goal model and performing correct moves when building. A similar case was that of the subscale of 'initiative-activation'. This subscale was difficult to tell apart from the subscale of 'working autonomously' because both looked in one way or another at the extent to which children worked without the help or direction of an adult. Therefore, only the subscale of 'working autonomously' (subsequently labelled as 'asking for help') was included in the analysis. As will be reported in Section 4.2.3, the effort to ensure difference among subscales was productive, as indicated by the absence of multicollinearity among the final ratings from all subscales.

One of the problematic consequences of clearing the SBOS subscales from indications of good final achievement, however, was the potential under consideration this could generate of self-regulatory moves which were indeed conducive to building success. In order to avoid this danger, a specific subscale was created to measure directly those successful building moves attributable to self-regulation:

- *Effective control of problems.* This subscale was applied when children faced difficulties, measuring the extent to which they were able to self-regulate to overcome such challenges. Consequently, this subscale did not measure the extent to which students were able to place cubes correctly (i.e. indicative of achievement), but rather the portion of this successful placement attributable to self-regulation of difficulties.

Another research aim for which self-regulation was measured was to explore the degree to which self-regulatory behaviours might have been learned from teaching. In order to allow for

this type of enquiry, the SBOS had to be expanded to include behavioural demands observed in classrooms which clearly reflected self-regulated learning (e.g. asking students to plan before a learning activity). Among the behaviours included under this criterion were:

- *Planning before.* This behaviour was included after observing that on various occasions teachers provided students with the opportunity to plan their activities before engaging in them (particularly in English classrooms and before group work).
- *Evaluation.* This behaviour was included after observing how sometimes teachers would ask students to revise/improve their work when they claimed they had finished a task.
- *Asking for clarifications.* This behaviour was included after observing how on various occasions teachers gave students the opportunity to ask for clarifications following the instructions given for particular learning activities.
- *Use of building strategies.* This behaviour was included following the observation of some teachers teaching their students specific strategies to achieve good results in their classroom tasks.

4.1.1.1.3. Examination of subscales' construct face validity

Construct face validity, or the extent to which the scales intended to be used seemed to measure behaviours indicative of what they were supposed to measure (Jupp, 2006), was examined by consulting other researchers working within the 'monitoring and control' model of self-regulation. Many of these researchers were either more experienced PhD students or early career academics who had worked under the supervision of Dr David Whitebread (one of the two supervisors of this thesis), who was also consulted as an expert on the topic.

The main purpose of this validation was to determine if experienced researchers who had work within the Nelson and Narens (1990) theoretical framework of self-regulation agreed or not with the different considered subscales as being part of what they would regard as self-regulation. As mentioned in previous chapters, this theoretical model suggests that self-regulation could be theorized to be the combination of *monitoring* one's own thinking/activities and subsequent *control* of thinking/activities in a way that could be conducive to reach a goal in mind. All of the more experienced research students consulted as experts also assisted in the inter-rater process to ensure measurement reliability. Therefore, their input was useful for assessing the construct face validity of the subscales, both as judged through their first impressions of the subscales and through their application of the subscales.

4.1.1.1.4. Examination of subscales' inter-rater reliability

Reaching adequate levels of inter-rater reliability, understood as high consistency between two or more people in the classification of objects of analysis into analytical categories, has been

claimed to be a fundamental step to ensure trustworthiness of numerical transformation and treatment of qualitative data (Boyatzis, 1998). Such levels make it possible to state that what are considered to be characteristics of the researched objects are not simply the reflection of perceptive idiosyncrasies of its analysts (Gwet, 2014). However, high levels of inter-rater reliability do not necessarily indicate that a specific coding scheme is reliable, but rather that two or more people can develop enough joint understanding of it so as to allow for them to agree on the identification of the distinctive codes in the data (Boyatzis, 1998). This is particularly the case when the analytical categories are more social than behavioural, given the higher levels of inference required when analysing social features; or when applying overall rating scales rather than looking at specific behaviours on a moment-to-moment basis, as such an overall interpretation usually introduces socially-based understandings (Bakeman and Quera, 2011). This was clearly the case of the SBOS scale, where an inter-rater trial of the SBOS and the newly developed subscales led to some important adaptations and specifications (see scale supporting notes in Appendix 4) in order to achieve a good level of joint understanding and reliability between raters when analysing each type of target behaviour.

The original SBOS version by Dermitzaki, Leondari, and Goudas (2009) had reported a good overall level of inter-rater reliability (an average of intraclass correlations of 0.77). The authors, however, did not report on the reliability for each of the 12 observational scales separately as their main objective was to define how composites of behaviours (cognitive, metacognitive or motivation strategies) and not individual behaviours predicted performance. Nevertheless, ensuring a good level of reliability within each observational scale was paramount within this study. This was particularly important so as to allow for the examination of the role of culture in students' adoption as well as the psychological and pragmatic functionality of different ways of self-regulating. Many subscales, therefore, had to be adapted in order to ensure their own good levels of reliability. These adaptations aimed to address any disagreements between analysts considered to be potentially related to ambiguities or overlaps among descriptions of the 4 ordinal measurement levels forming each subscale as applied. An example of adaptations of the SBOS subscales will be offered shortly in Section 4.1.1.1.6. following the presentation of a summary of the finally applied SBOS II and the inter-rater reliability achieved.

4.1.1.1.5. SBOS II and levels of inter-rater reliability achieved

The SBOS II was formed of 5 intact subscales of the original SBOS, 4 adapted, and 5 newly developed ones measuring self-regulation. This gave a total of 14 subscales. Each subscale was measured using a 1 to 4 rating, where 1 represented a lower and 4 a higher level of expression. The only exception was *asking for clarifications*. This behaviour was measured as a simple frequency of number of questions asked by a student during any given task. A summary of all the subscales forming part of the SBOS II is presented in Table 4.2 (to see the complete scale go to

Appendix 4). The table also includes levels of reliability achieved in their application during the inter-rater process.

Table 4.2 Self-regulatory Behaviour Observation Scale (SBOS) II - summary

Theorised self-regulatory function	Self-regulatory behaviour*	Description - summary of students' behaviour	Reliability Krippendorff's alpha (and % of absolute agreement)	Origin
Metacognitive monitoring	Awareness of errors	Noticing incurred errors, not passing over them.	0.84	Original SBOS
	Monitoring	Pauses to check: progress of building, effectiveness of building, or understanding of goals.	0.71	SBOS adaptation
	Use of model	Consulting the card model between building moves.	0.71	SBOS adaptation
	Evaluation	Quality and length of figure check once reaching the end of the task.	0.87	New
Metacognitive control	Effective control of problems	Successfully controlling problems/errors when facing them.	0.91	New
	Planning before	Length spent examining the task goal (i.e. card model) before starting to build.	0.76	New
	Planning during (order)	Approaching task in an organised manner, following a certain logic or order.	0.75	Original SBOS
	Use of building strategies	Spontaneously developing and applying a variety of building strategies to carry out the task.	0.80	New
	Learning from errors	Stopping incurring in any type of error (i.e. getting colour, shape or size of figure wrong) after noticing and fixing them once.	0.83	Original SBOS
	Asking for clarifications	Asking for clarifications that are autonomy enabling, including questions that students asked to clarify the goal, rules, materials or nature of the task.	0.79	New
	Asking for help	Asking for assistance, by requesting clues or evaluation of performance from adult while carrying out a task.	0.64 (88% agreed)	SBOS adaptation
Motivation	Effort (or persistence)	Engaging effortfully in re-thinking or re-doing a challenging part.	0.70	SBOS adaptation
	Concentration	Sustaining attention on the task, or (conversely) distracting from task.	-0.13 (69% agreed)	Original SBOS
	Maintaining motivation	Motivating oneself to retain interest in the task.	0.35 (69% agreed)	Original SBOS

As can be seen from the summary table of the SBOS II, the different self-regulatory behaviours included as part of this scale were theorised to represent the psychological self-regulatory dimensions of either metacognitive monitoring, metacognitive control, and motivation self-regulation. Those behaviours considered as metacognitive monitoring were regarded as student actions that might be indicative of them becoming aware of own current thoughts or behaviours (Hacker et al., 2009). Among these were the self-regulatory behaviours labelled as *awareness of errors* (or noticing errors), *monitoring* (pausing to check building progress/understanding), *use of model* (pausing to check card model), and *evaluation* (assessing building accuracy once finished).

Moreover, those behaviours considered as metacognitive control were student actions regarded as indicative of them modifying their own current thoughts or behaviours (Hacker et al., 2009). Among these were the self-regulatory behaviours labelled as *effective control of problems* (solving difficulties after noticing them), *planning before* (using time to examine the card model before any building), *planning during (order)* (following a particular order when building), *use of building strategies* (applying a variety of building strategies*), learning from errors* (stopping

incurring a particular type of error after fixing it once before), *asking for clarifications* (asking the researcher questions to reach clarity about goals/rules/materials of the task), and *asking for help* (asking the researcher for clues when in difficulties or evaluation of building when uncertain).

Finally, the behaviours theorised as reflecting motivation self-regulation were those considered to indicate students maintaining themselves engaged in the task carried out. Among these were *effort* (intensity of persistence when facing difficulties), *concentration* (number of times the students got distracted by external stimuli or self-distracted during building), and *maintaining motivation* (level to which child retains interest in the task). It is important to note that while *awareness of errors* and *effective control of problems* represented effective metacognitive monitoring and control, all other behaviours were not necessarily linked to *effective* self-regulation. That is, their occurrence did not necessarily indicate children's awareness or successful control of difficulties. Also, *learning from errors* is the only behaviour that could be considered to be indicative of self-regulated learning as such. Moreover, strictly speaking neither the scale of *awareness of errors*, nor *effective control of problems*, nor *learning from errors* were labelled in relation to discrete 'behaviours', but given that they are measures based on observable behaviours and to help simplicity, they are referred to as self-regulatory behaviours throughout this thesis. It is also relevant to point out that all the different behaviours considered here to reflect effective metacognitive monitoring, metacognitive control, or motivation self-regulation, are simply theorised as such. Whether these should be considered as part of these different dimensions of self-regulation or simply different from self-regulation is examined empirically in Section 5.2.2 when exploring the psychological functionality of these behaviours within each country sample through factor analyses.

The SBOS II summary table also includes a report of the levels of measurement reliability of each subscale as achieved through an inter-rater process. As part of this process, the behaviours of 5 randomly selected students (10.2 per cent of the data) while carrying out 11 to 13 tasks each (a total of 60 tasks) were analysed in parallel by two independent raters after a period of training.[19] Consequently, the process to ensure a good level of reliability across all the 14 subscales of the SBOS II required achieving a good level of consistency in over 840 rating decisions per rater (60 x 14). Due to the magnitude of this enterprise, different researchers were recruited to assist with the inter-rater process for different subscales. During the inter-rater process, each rater watched and rated the behaviours of each child separately and differences were discussed before moving on to rate the behaviours of the child in the following task. When

[19] Training was conducted through the analysis of the behaviour of different children to those included as part of the final inter-rater exercise. This procedure was followed to ensure that levels of inter-rater reliability were not simply the reflection of raters' learning of each others' perspectives about students' behaviours previously discussed.

this was not possible, all behaviours of one child were rated independently by each rater and differences were discussed before rating the behaviours of the next child.

As can be seen from Table 4.2 above, most levels of reliability ranged from Krippendorff alphas[20] of 0.64 to 0.91. Following Altman (1991) these levels of inter-rater reliability were considered to be good (0.60-0.80) or very good (0.80- 1). Percentages of absolute agreement rather than *k* alphas were considered to be more appropriate when the variability of the data was poor within a particular subscale. This decision was taken because, as with any other measure of consistency, *k* alphas relied on data variability for accurate calculation (Hayes & Krippendorff, 2007). Among those behaviours with low variability were *concentration* and *maintaining motivation* (both mainly judged as 4 and occasionally as 3 by both raters on the 4 point scales). For the case of these two subscales, levels of absolute agreement reached 69% (while their *k* alphas were -0.13 and 0.35, respectively). These scales had the lower levels of inter-rater reliability achieved among all the SBOS II subscales.

Moreover, two extra subscales were created to measure aspects related to task performance, such as the *level of challenge* that the cube assembly tasks carried out seemed to represent for each student, and the level of *final task accuracy* they achieved. These two scales also underwent a process of inter-rater reliability over 10.2 per cent of the data (120 rating decisions per rater) to ensure they were measured with rigour. Both reached a good level of reliability with 0.75 and 0.66 Kippendorff's alpha coefficients, respectively. A summary of these two subscales is presented in Table 4.3.

Table 4.3 Measures of students' performance in the cube assembly task

Performance behaviour	**Description - summary of students' behaviour or result**	**Reliability** Krippendorff's alpha (and % of absolute agreement)	**Origin**
Level of challenge	A combination between the level of difficulty a task seemed to represent for a student (as judged though frequency of pauses) and the extent he/she was able to overcome such difficulties. No pauses indicated low challenge. Frequent pauses with low outcomes indicated high challenge.	0.75	New
Final task accuracy	Similarity between card model and built figure. Holistic measure of number of errors incurred after student declared to have finished the task.	0.66 (90% agreed)	New

4.1.1.1.6. Examples of development of SBOS II from the original SBOS

As has been mentioned above, various subscales of the SBOS II were adapted versions of those from the original SBOS. Validity and reliability checks were the main reasons leading to the adaptations. The *use of model* subscale is used here as a case for which various changes were

[20] Krippendorff alpha was considered to be an appropriate measure of consistency to calculate inter-rater reliability for the case of the SBOS II, because it has been considered to be a measure that can be used over ordinal data that also adjusts for the possibility of agreeing by chance (Hayes & Krippendorff, 2007).

carried out based on validity and reliability checks. The original version of the subscale is presented first followed by an example of an intermediate version (unsuccessfully applied during the inter-rater process), and lastly the final version included as part of the SBOS II. Each of these are commented on in relation to the changes leading to their adaptations.

Effective use of model (version 1 from original SBOS):

1. Child does not utilise the model at all
2. Child uses the model spontaneously
3. Child uses the model occasionally, mainly when facing difficulties
4. Child utilises sufficiently and effectively the model

As can be seen from this original version of *use of model* found in the SBOS, this subscale intended to measure the 'effectiveness' with which children made use of the reference model while replicating it with the colour cubes. The inclusion of the criterion of 'effectiveness' was revised for the case of this subscale in relation to fit for purpose, specifically regarding their intended use of predicting task achievement.

As mentioned before, in order to be able to trust any predictive relationship found between the measured self-regulatory behaviours and *final task accuracy*, the subscales of the SBOS II had to avoid the inclusion of descriptions confounding self-regulation with achievement. For this reason, level 4 of the subscale, designed to capture the sufficient and effective use of the model, had to be changed. If this level was left unchanged then it would have been very likely that most of the times children achieved a high level of *final task accuracy*, the highest level of *use of model* (sufficient and effective use of the card model) would have needed to be assigned. Inspired by the idea of separating self-regulatory behaviours from task achievement, a new version of the scale was developed.[21] This new version simply tried to measure the extent to which children used the model, regardless of whether its use was or was not helpful for them.

Use of model (intermediate version of SBOS II):

1. Child does not use the model at all
2. Child uses the model rarely
3. Child uses the model occasionally
4. Child frequently uses the model

The intermediate version presented above was trialled as part of the inter-rater process. As can be seen from its descriptions, the subscale tried to simply measure the frequency of use of the

[21] Note that *awareness of errors* was not coded in terms of its effectiveness for final task achievement but rather simply in terms of whether it indicated awareness of an error, not the successful fixing of an error. *Effective control of problems*, on the other hand, might be considered as more likely to be related to higher levels of *final task accuracy* by design. This is because it accounts for the eventual successful placing of cubes children struggled to place.

card model. Preliminary results regarding consistency between raters when applying this scale were, however, very low (spearman correlation coef. 0.36). Therefore, in order to improve the inter-rater reliability some adjustments had to be made over the version presented above.

The reasons leading to the low level of reliability of these versions of the subscale were thought to be the ambiguity of its descriptions, in particular what could be considered as 'rare', 'occasional' and 'frequent' use of the model. Two options for overcoming this ambiguity were considered: to define the number of model consultations in each level described; or to define the unit of analysis (e.g. time lapse) for which the frequency was going to be judged. The first option was discarded due to the varied sizes of the different 13 models that could be presented to the students. Given that some models were made of 6 cubes and others of 40 cubes, a fixed numbers of consultations to be applied similarly across models was considered to be an inappropriate solution, as more complex figures would show higher use of model than simpler ones. Therefore, the alternative option of refining the definition of the unit of analysis over which each judgement could be exercised was explored. In order to simplify the analysis, rather than requiring analysts to constantly check time slots, an equivalent, more intuitive unit of analysis, namely the extent to which children made use of the model between building moves, was trialled. Here the extent to which students made use of the model between each time they placed a cube or cubes was assessed. The final version, which was also accompanied by a clarification note, is presented as follows.

Use of model[22] (final version applied as part of SBOS II):

1. Does not use the model at all
2. Uses the model only occasionally between moves
3. Uses the model frequently between moves
4. Uses the model almost every time between moves

As can be seen from the final version of the subscale of *use of model*, this scale centred on measuring the frequency with which students made use of the model, regardless of the effectiveness of such consultation. This was aided by leaving the measurement of *use of model* free of predefined function. Some interesting findings in relation to how this particular

[22] Building moves should be understood as a continuous building activity that seem to be linked to a specific building purpose. Sometimes this purpose might be to place one cube, at other times it might be to place two to three cubes at once. The coder would need to interpret what can be considerable as a one move for the specific student under study. This scale does not measure a "sufficient use of the card model" but its observable use. Level 1: Consider this when child looks at the model quickly before engaging in building but then builds from memory the whole figure; Level 2: Uses the model only occasionally: consider a few times between moves while building; Level 3: Uses model frequently; considers with certain frequency but not consistently (e.g. looks at it frequently at the beginning and then does not refer to it with similar frequency when building the last part of the model); Level 4: Utilizes the model almost every time or quite consistently between moves.

behaviour was used differently according to culture will be presented and discussed in chapter 5 when presenting findings (Section 5.2.2.2). The final level of measurement reliability of this subscale was considered to be good, with a Krippendorff's alpha of 0.71.

In summary, for the case of this subscale, initial changes followed a criterion regarding its usability for the purposes of the research fit for purpose. Once this criterion had been applied the criterion of measurement reliability directed the subsequent changes, driving changes that helped the analyst to be more accurate in their application of the measure. Similar processes were undertaken in relation to the analytical tool used to analyze students' interviews exploring their achievement motivational attitudes, and when analyzing teacher talk in the classroom. The process undertaken to develop these other types of coding schemes is reported in the next two sections.

4.1.2. Analysis of students' achievement motivational attitudes through interviews

Interviews were conducted to gain insights into students' motivational attitudes towards achievement. In particular, the purpose of their exploration was to understand the role that cultures may have in student adoption of such attitudes and the attitudes' pragmatic functions. As it was difficult to anticipate the particular achievement motivational attitudes regarding which the cultures under study might play a role, student interviews were initially analysed through thematic analysis to ground the analysis in students' own attitudes rather than predefined ones. The themes obtained were the product of an iterative analytical process that was theoretically driven but also strongly grounded in the data. The final themes found through the thematic analysis were then applied as coding categories throughout all student interviews after an inter-rater process ensured the reliability of the analysis. This subsection reports the analytical process followed to develop the applied interview coding scheme, including the interview questions from which such data originated, initial thematic analysis, testing of the reliability of its application through an inter-rater process, and examples of final application.

4.1.2.1. Interview conducted and nature of the data

The semi-structured student interview conducted consisted of four open-ended questions specially formulated for this study and whose original aim was to explore students' achievement goal orientations, specifically the aspects found to be most related to self-regulation. Figure *4.1* shows the questions asked.

Figure 4.1 *Interview questions examining students' achievement motivational attitudes*

1- What motivates you more: to demonstrate your abilities to others, like the teacher, classmates and family, or to demonstrate them just to yourself? Why?
2- How much do you like competing or comparing yourself to others (inside and outside the classroom)? Why?
3- How much do you like challenging yourself? For example, if there is something you find difficult to do, do you try hard to do it or do you prefer to leave it aside and do something else instead? Why?
4- When you make a mistake, do you prefer someone to let you know what you have done wrong, or do you prefer not to know about what you did wrong? Why?

Considering that previous literature has found that a mastery approach predicts higher self-regulation and performance avoidance predicts lower self-regulation, the interview questions were specially designed to try to explore relevant characteristics of these two types of goal orientations. Therefore, among the attitudinal aspects they attempted to explore were whether students: i) approached success or avoided failure (approach v. avoidance valence) (e.g. question 3); ii) considered intrapersonal or normative standards for self-evaluation (e.g. question 1 and 2); iii) engaged in achievement situations because they were more interested in either personal improvement or performing to others (e.g. questions 3 and 4).

Here it is important to note that while the interview questions intended to explore students' beliefs in relation to these different aspects of goal orientations, in practice what they did was to explore students' attitudes towards key features of goal orientations, as well as their motives for adopting such attitudes. For example, when asked if they got more motivated by demonstrating abilities to others or just to themselves, students were asked to indicate a preference which ultimately reflected their positive or negative attitude towards doing one thing or the other. Moreover, when asked why they expressed such a preference, students indicated the reasons, which were ultimately the motives driving their preference. Similar to achievement goal orientations, students' responses mixed attitudes and motives (Elliot and Thrash, 2001). Nevertheless, the differences between the analytical categories that emerged from students' interview answers and the more traditional understandings/measures of achievement goal orientations made it necessary to consider them as conceptually distinctive. Therefore, for the sake of empirical and theoretical clarity, within this study, analytical categories generated from students' interview answers have been broadly categorized as 'achievement motivational attitudes' (or simply 'motivational attitudes'). The consideration of both attitudes and motivations was especially relevant following the theoretical contributions by Social Psychologists such as Bergman (1998), who considers that combinations of attitudes and motives could be understood to reflect personal value systems, likely to reflect internalizations from cultural value systems (Kitayama, 2002).

4.1.2.2. Development of coding scheme

As previously mentioned, in order to develop the final coding, a thematic analysis followed by an inter-rater process took place. Each of these processes are reported in the next subsections.

4.1.2.2.1. Thematic analysis of interviews

A thematic analysis was first carried out on the responses of 16 of the participating students (2 from each participating classroom) to map the different attitudes towards achievement held by students. Analysis took place using NVIVO software and was conducted directly from the interview audios. The different stages of a thematic analysis, namely descriptive coding, interpretative coding, and definition of overarching themes (King and Horrocks, 2010) were conducted.

4.1.2.2.1.1. Descriptive codes

During the phase of descriptive coding, 16 interviews were completely coded using descriptive codes that summarized the main aspects of the ideas communicated by students without any influence from theory. This phase generated 97 descriptive codes. A list with some examples of descriptive codes related to the reasons given by students to explain why they liked showing their abilities to others is presented in Figure 4.2.

Figure 4.2 Examples of descriptive coding about demonstration of ability

Students like demonstrating abilities to others, because:

- -It allows them to show they are smart
- -They can show superiority to others
- -It is fun or exciting
- -It allows people to identify what others are good at, enabling future mutual collaboration
- -It helps others to learn from them
- -They think one does not learn from only showing oneself what one can do
- -It allows others (e.g. teacher) to know where they need help
- -It allows them to share with others, taking part

Students think that demonstrating abilities to others is good, IF:

- -Shown to supportive people

As it can be seen from these examples, the phase of descriptive coding allowed for mapping the different reasons motivating students' initial responses to the interview questions.

4.1.2.2.1.2. Interpretative codes

The second phase, interpretative coding, was conducted next. Interpretative codes were created based on meaning and considering the purpose of the analysis (Braun & Clarke, 2006). Therefore, these new codes aimed to try to capture broader reasons underlying students'

attitudes towards attitudinal objects such as displaying abilities to others or allowing others to point out own errors. No theory as such was imposed on the interpretative codes at this stage in order to avoid simply arriving at the same categories developed by previous studies and ignoring new relevant analytical categories (King and Horrocks, 2010). However, given that the interview questions were based on goal orientation theory, two broad attitudinal objects strongly afforded by these questions were identified: i) Attitudes towards effortful activity, and ii) attitudes towards performance. Students attitudes towards effort included those student attitudes related to liking/disliking engaging in effort investment, challenges, and mistake recognition. Students attitudes towards performance included those student attitudes related to liking/disliking displaying own abilities to others, competition, or applying others' performance as a point of reference to evaluate own performance.

Moreover, different motives sustaining liking or disliking engaging in effortful activity or performance were also identified as interpretative codes. As these interpretative codes emerged from students answers to follow up 'why?' open-questions, they were not influenced (only facilitated) by the questions themselves, and therefore not by theory. The number of these motives changed between 14 and 21 through the different analytical iterations. Figure 4.3 and Figure 4.4 show, respectively, a summary of the most extensive list of codes that were a product of the last interpretative process carried out regarding motives driving students' attitudes towards effortful activity and performance.

Figure 4.3 Summary of interpretative codes for attitudes towards effortful activity

Student ***likes/approaches*** engaging in **effortful activity** (persistence/challenge/mistake recognition), motivated by:
Promotion of own learning
Promotion of own personal improvement
Intrinsic value of effort
Wanting to help others to improve
Enjoyment of activity material
Enjoyment of activity social dimension
External social pressures/rewards
Wanting to feel good about oneself (self-esteem)
Student ***dislikes/avoids*** engaging in **effortful activity** (persistence/challenge/mistake recognition), motivated by:
Wanting to avoid feel unable in case of failure following effortful activity
Portraying a higher *academic* status than others
Portraying a higher *social* status than others

Figure 4.4 Summary of interpretative codes for attitudes towards performance

Student ***likes/approaches*** engaging in **performance** (displays of own performance, competitions, or using others' performances as point of reference to self-evaluate own performance), motivated by:
Wanting to affiliate with others
Wanting to ensure high *academic* status
Wanting to ensure high *social* status
Promotion of peer learning
Promotion of own learning
Student *dislikes/avoids* engaging in **performance** (displays of own performance, competitions, or using others' performances as point of reference to self-evaluate own performance), motivated by:
Avoidance of lower *social* status
Avoidance of lower *academic* status
Protection of relationships with others or protection of others
Avoidance of feeling unable (self-esteem)
A dislike of competition

These interpretative codes were the reflection of similarities among descriptive codes. For example, approaching performance driven by the motive of wanting to 'ensure a high academic status', originated from collapsing descriptive codes such as those of liking displaying performance driven by reasons such as wanting to show superiority and show that they were smart. Similarly, the interpretative code of approaching performance driven by the 'promotion of own learning' was generated from collapsing descriptive codes such as liking to display own abilities to others so others could know where they (the students) might need help, and because they thought that one does not learn from only showing oneself what one can do.

4.1.2.2.1.3. Themes

Finally, in the last phase of the thematic analysis, interpretative codes were further collapsed into overarching themes. Following King and Horrocks (2010), the themes defined tried to represent broad motives found to be recurrent across interviews and that related in one way or another to theory. Therefore, characteristics of defined goal orientations found to be relevant for self-regulation in previous studies inspired their definition. As mentioned before, the initial responses to the interview questions were already theory driven, so no changes were incorporated into the analysis of these initial attitudinal responses. These are summarized in Figure 4.5.

Figure 4.5 Description of attitude themes found in the data

Attitude theme	Valence	Description
Attitude towards **effortful learning**	Approach Avoidance	Student attitude towards engaging either in investing effort, facing challenges, allow friendly others to point out his/her errors
Attitude towards **performance**	Approach Avoidance	Student attitude towards engaging either in demonstrating current skills to others, or comparing/competing against others

As can be seen, attitudes towards effortful activity tried to capture whether children held beliefs supporting valuing either approach or avoidance of effort investment, pursuing or avoiding challenges, and the allowance of not of others pointing out their errors (a sort of action reflecting a higher value of improvement than academic status). Considering that effort was generally referred to in relation to achievement situations in which children learned a skill or a content, this was later labelled as 'effortful learning', indicating its theoretical closeness to mastery orientations. On the other hand, attitudes towards performance represented students' adoption or fear (rejection) of the use of normative standards for their own self-assessment. Such adoption or rejection of normative standards was assessed by looking at the level of interest that students put into social evaluations of their performance by showing their performance to others or comparing it with that of others.

On the other hand, motive themes were the result of a theory driven merging of interpretative codes which were originally strongly grounded in the data. Figure 4.6 shows a summary of the different motive themes identified.

Figure 4.6 Description of motive themes found in the data

Motive theme	Description
Intrinsic value of learning	Gain personal learning, understanding or improvement OR personal intrinsic value of effort investment, or of a content/activity.
Helping others to learn	Help others to learn or improve.
Performing high or higher than others	Demonstrate high level of competence to others. Prove to be better or not to be worse than others, meet others'/social expectations, or pursue social rewards. (It differs from feeling able and avoiding feeling unable in the sense that it does not refer to feelings, but rather to a concern about performance and its pragmatic results).
Feeling able	Promote a feeling of positive personal self-concept as a learner, demonstrating to him/herself that he/she is able or competent, or feel good about him/herself in relation to his/her performance.
Avoiding feeling unable	Avoid feeling incompetent/unable, protects self from embarrassment from failures of performance, or protects self from lowering learning self-concept.
Relating to others	Promote positive (or supportive) relationships by sharing with others (taking part, having fun, belonging to groups such as family and friends), protecting relationships from conflicts, or other people from embarrassment.

The definition of the themes 'intrinsic value of learning' and 'performing high or higher than others' were inspired by the theoretical distinction between intrapersonal and normative standards for achievement self-assessment found in mastery and performance orientations, respectively. The motive themes of 'feeling able' and 'avoiding feeling unable' were inspired by the distinction of the approach of success and avoidance of failure being found in people holding mastery and performance goal orientations. Finally, the motive themes of 'helping others to learn' and 'relating to others' were less based on theory and more on the data itself. These types of pro-social motives are not included within goal orientation theory to date but were considered given their strong presence across the students' answers to the interview questions. Some examples of how both theoretically and empirically driven themes related to students' answers are offered in the following paragraphs.

For example, the motive of 'performing high or higher than others' was inspired by students' application of normative standards as drivers of their achievement engagement. Such was the case of motives reflecting students' interest in what other people might think of them, such as wanting to demonstrate high levels of competence to others, prove to be better or not to be worse than others, meet others'/social expectations, or pursue social rewards. So, 'performing high or higher than others' was the result of merging interpretative codes such as approaching/avoiding performance in order to 'ensure a high academic status' and 'ensure a high social status', or conversely 'avoid lower academic status' and 'avoid lower social status', as

well as approaching/avoiding effortful learning motivated by 'external social pressures/rewards' and 'portraying a higher social status' or 'portraying a high academic status'. The motive of 'relating to others' was inspired by students' answers referring to liking displaying their own current abilities to others in order to be social with them, as well as students expressing a dislike of displays or comparison of abilities due to the possible social conflicts to which these can lead.

4.1.2.3. Analytical procedures for application of coding scheme to interviews

Following the thematic analysis to develop the coding scheme, the analysis of the interview answers of all students through applying the scheme in order to transform qualitative information into numerical information for subsequent statistical analysis was conducted. The objective of the codification of students' interviews was to have a measure of the level to which students adopted the different achievement motivational attitudes considered. In order to have a fairer representation of the strength of attitudinal adoption, codification was carried out at the level of each idea expressed by each student. Moreover, to avoid confusion between a higher adoption of a particular attitude and the simple repetition of a particular idea, repeated ideas were coded only once. This way, students who ended up with higher levels of a particular achievement motivational attitude could be said to have expressed such an attitude through different means (generally through different examples or opinions). In general, students tended to refer to the same achievement motivational attitudes in no more than 6 different ways.

As can be seen from the coding scheme presented in Table 4.4, both attitudes and motives were coded in parallel. In practice, students' initial preferences (e.g., approaching or avoiding effortful learning) expressed in response to interview questions were considered to be attitudes towards the attitudinal objects of effort and performance. These attitudes were labelled as 'orientations' because they reflected whether children were oriented towards achieving intrapersonal or interpersonal standards when engaged in achievement situations. Moreover, the motives (reasons) given by students for approaching or avoiding effortful learning or performance were labelled as 'achievement motives', as they reflected the motives driving students to adopt either 'orientation' in achievement situations. Finally, as most of the time children would include both attitudes and motives as part of an answer, the combinations between these 'orientations' and 'achievement motives' were also considered. Such combinations were labelled as 'goal oriented motives' because, when combined, they provided information about the motives motivating students' attitudes. In this case, the reasons expressed by students (their motives) reflected the goals they were trying to achieve (e.g., feeing able, relating to others) by adopting or not an intrapersonal (effortful learning – overcoming challenges and errors) and interpersonal (performance) orientation to self-assess their success.

Moreover, as has been mentioned previously, part of the main purposes of studying students' achievement motivational attitudes through the interview, was to see the relationship between these and self-regulation across cultures. In order to do this, quantitative analyses were considered to be good ways to check such relationships between these types of data in consistent and direct ways using the information from all participating students. But in order to allow for such analysis, reliable numerical transformations of the interview data needed to take place. An inter-rater process aided in ensuring that the product of such a transformation was not simply a reflection of the personal interpretations of a single researcher.

Over 10% of the data was coded as part of the inter-rater process. Initially, levels of reliability were poor between raters, but further clarification and incorporation of coding rules allowed for improvement of levels of reliability. Among the changes included as part of this process were the distinctions between relevant and non-relevant information, as well as clear and ambiguous answers and researcher led v. non-led answers. The process also required taking decisions about how to treat students' answers that indicated attitudes without any explained 'achievement motive' or in relation to other 'achievement motives' not included as themes. As a result, two new analytical categories (codes) were included, namely 'irrelevant, ambiguous or led answer' and 'not specified or other motive'. Among some examples of the clarifications added to previous descriptions was a note clarifying that improvement could include students wanting to get right something that they did not get right before (see description of *learning motive*). Another clarification was that which defined social recognition as a type of social reward (see description of *performing high(er)*). A table with the final version of the coding scheme is presented in Table 4.4.

Table 4.4 Coding scheme for analysis of students' 'achievement motivational attitudes'

Goal oriented motive (combination between attitude and motive themes)				
	Orientation or behavioural attitude (themes)			
	Effortful learning		**Performance**	
Achievement motive (themes)	Student attitude towards engaging either in investing effort, facing challenges, or allowing friendly others to point out his/her errors		Student attitude towards engaging either in demonstrating current abilities to others, or comparing/competing against others	
	Approach	***Avoidance***	***Approach***	***Avoidance***
1. Learning	Gain personal learning, understanding or improvement (includes getting right something students did not get right before); or personal intrinsic value of effort investment, content or activity.			
2. Helping others to learn	Help others' to learn or improve.			
3. Performing high(er)	Demonstrate high level of competence to others, prove to be better or not to be worse than others, meet others/social expectations, showing good/accurate performance, pursuing rewards/recognition, and avoid not showing good performance. Consider that performing high(er) differs from feeling able and avoiding feeling unable in the sense that it does not lead to thinking about feelings, but a concern about performance and its pragmatic results.			
4. Feeling able	Promote a feeling of positive personal self-concept as a learner, demonstrating to him/herself that he/she is able or competent, or feel good about him/herself in relation to his/her abilities.			
5. Avoiding feeling unable	Avoid feeling incompetent/unable, protects self from embarrassment from failures of performance, or protects self from lowering learning self-concept.			
6. Relating to others	Promote positive (or supportive) relationships by sharing with others (taking part, having fun, belonging to groups such as family and friends) or protecting relationships from conflicts and other people from embarrassment.			
7. Other or not specified motive	Student refers to other reasons than the ones above or just does not specify a reason.			
Ambiguous, irrelevant or led answers	Answer from the student is too ambiguous / unclear to allow codification, or it indicates two different codes at the same time within same idea; or it is irrelevant to the 4 interview questions; or student says he/she thinks the same as peer but does not explain why with his/her own words. Some examples of ambiguous answers that may be relevant but not clear are: avoiding effort because of wanting to avoid frustration (if they do not explain why they get frustrated), or putting effort to complete task and not explaining what motivates the completion of it (e.g., intrinsic value, feeling able, etc.).			

Notes: Only answers that were relevant to achievement, learning of skills and development understandings were coded. When there was irrelevant information at the same time as relevant information within an answer only the relevant information was coded.

Five different interviews – over 10% of the data – were analysed as part of the inter-rater process. Coders had access to a supporting document including more detail explanations of the motives children linked to their initial orientation (see Appendix 8) and examples of goal oriented motives (see Table 4.5, for a list of some of these examples). Interviews were pre-segmented before the inter-rater process started based on 'units of meanings' considered to be the most appropriate for the research questions of the study (Strijbos et al., 2006). Given this study's interest in exploring children's attitudes and motives, a unit of meaning was understood as a series of ideas containing both children's personal preferences and reasons justifying these preferences. This pre-segmentation was carried out considering the difficulty that other researchers have found in agreeing on segments of conversational and choppy semi-structured interviews, with differences in segmentation between analysts making it impossible to define the discriminant capability of a coding scheme (Campbell et al., 2013). Codification was exhaustive and codes were treated as mutually exclusive. Given that, in general, students were expected to answer in relation to performance when answering question 1 and 2, or effortful learning when answering questions 3 and 4, reliability analysis were carried out separately for these two groups of questions. Therefore, each measure of reliability indicates the level of agreement between raters when analysing effort or performance related answers.

Cohen's Kappa ranged between 0.47 and 0.89 for performance, and 0.56 and 0.81 for effortful learning. While the lower level of reliability represents agreement when codifying interviews independently, the higher level of reliability represents the agreement between the main researcher and the agreed codes between the two raters (main researcher and second coder) after differences were analysed in conjunction. While the initial levels of reliability were low, the higher levels achieved after discussing differences indicate that initial interpretations of the main researcher could be considered appropriate. Given the relatively high level of interpretation required in the analysis of interviews (Boyatzis, 1998; Braun & Clarke, 2006), the adequacy of the interpretations of the main rater was considered sufficient. This last level of reliability provides confidence in the way the data was subsequently analysed. Moreover, the theoretically sound findings of the predictions of students' achievement and effort allowed by the codification of achievement motivational attitudes (to be reported in Section 6.2.2.2), will also attest to the adequacy of the interpretation and subsequent coding of students' interview answers. Lastly, in the next and final subsection regarding the analysis of students' achievement motivational attitudes, some examples of codes application are offered so the reader can examine the validity of the interpretations as well as understand better the process of codification that took place.

4.1.2.4. Examples of analysis

Table 4.5 shows examples of some of the codes found in the data. As the reader will notice from these examples, on various occasions, students offered answers including examples from their own lives inside or outside the classrooms. Such embeddedness of students' answers in their everyday lives was particularly beneficial for this study, as it provided the results with more culturally relevant information.

Table 4.5 Examples of achievement motivational attitudes

Achievement motivational attitude (goal oriented motive)	**Example**
Performance approach driven by performing high(er)	Example 1. *"I like to show others what I can do to show that I am clever as well as showing people I can do things that they can´t do".* Example 2. *"I like competing because I have always liked winning. And my family has always let me win in games".*
Performance approach driven by helping others to learn	*"It is like you are teaching people something instead of teaching yourself something you already know. You are kind of passing it on to somebody else and then if you forget it they can remind you".*
Performance approach driven by learning	*"I like competing with more intelligent people, If the person is more intelligent, then I become more intelligent, that way I learn more".*
Performance approach driven by relating to others	Example 1. *"I like showing to family because they have known me since I was very little".* Example 2. *Sometimes I do like competing with other people if they tell me to do it, because it is not gonna hurt their feeling if they tell me to, even if they loose".* Example 3. *"I like showing my brothers all the tricks I can do with cards, being like a model for them".*
Performance avoidance driven by avoiding feeling unable	*"I don't like to show much to my family, because my brothers and sisters say I can't really do much. But when I show them, I like it a bit when I prove them wrong" .*
Performance avoidance driven by relating to others	*I like comparing myself to other people, but I do not like competing. Because competing is a bit tricky, because if you win then the other person gets sad.*
Effortful learning approach driven by learning	Example 1. *"Sometimes If I get a bad mark I do not mind what other say. Even if I get a bad mark I still keep putting effort into it".* Example 2. "*Before the two last tests I used to have very bad marks. I had a a 2 out of 7 mark so the teacher said that if I had a 6 out of 7 mark or more in a new test then she would change this really bad mark I had. So I quietly studied every night when I was supposed to be going to sleep, so my mum would not notice about the bad mark I had, and in the end I got a 6,7 out of 7. I liked it because it was a personal challenge, not a competitive one."*
Effortful learning approach driven by performing high(er)	*"At school I only challenge myself in my grades, because I lowered my grades, so I want to improve to have better grades by the end of the year. I frequently challenge myself in different subjects".*
Effortful learning avoidance driven by avoiding feeling unable	*"I do not like challenging myself too much because If you challenge yourself too hard, you might get frustrated sometimes that you can't do it, and then you might be a bit upset".*

4.1.3. Analysis of teacher talk

Teachers' classroom talk was analysed across the 8 different participating classrooms through socio-cultural discourse analysis (Mercer, 2004). Discourse analysis is committed to the study of what language is used for (Brown and Yule, 1983). According to Mercer (2010; Littleton and

Mercer, 2013), socio-cultural discourse analysis, in particular, focuses on the qualitative analysis of communication within social interactions used for the purposes of teaching, learning or an individual's cognitive development in a way that allows for subsequent testing of hypotheses. As with any other type of discourse analysis, it focuses on the functions of specific units of speech above the limits of the specific sentence, so the way that words and utterances (speech bounded by silences) function within contexts is understood (Walsh, 2011). Utterances can contain various communicative acts, which are the smallest analytical unit of classroom discourse (Hennessy et al., 2016). Communicative acts have been identified as the most appropriate unit at which to analyse teacher-student classroom interactions (Rojas-Drummond et al., 2013; Hennessy et al., 2016). This is likely to be because communicative acts can have more than one function (Stubbs, 1983), which allows for the analysis of different aspects of learning and development promoted simultaneously in everyday classrooms.

In this study, two types of teacher talk were considered, teacher 'regulatory talk' and teacher 'socio-motivational talk'. The first centred on capturing how teachers managed students' thinking through communication while interacting with them. The second attempted to analyse the way teachers structured their classrooms in terms of goal orientations. The purpose of considering these types of talk was to explore the extent to which students' self-regulation might have varied in relation to classroom cultures sustained by teachers' discourse.

In this section, the nature of the discourse data obtained and analysed is offered first. After that, the final versions of the two coding schemes applied for the analysis of teachers' talk are presented together with the rationale influencing their design. Finally, analytical procedures followed when applying the schemes to code teachers' discourse is presented. Due to space restrictions, a slightly more detailed account of the rationale underlying the development of these types of schemes is offered only for the case of 'socio-motivational talk'. For similar reasons of space, no intermediate versions of the schemes under development will be presented.

4.1.3.1. Nature of the data

As mentioned in the previous chapter, teacher talk was recorded through a wireless microphone teachers wore at all times during their video recorded Literacy lessons. This allowed access to teachers' communication with students while they were addressing their whole class, small groups, or individual students. Moreover, a second microphone was used to aid audibility of students' contributions when whole class interaction took place. Students' contributions were considered as contextual information that provided meaning to teachers' talk (e.g. allowing contextualization of teachers' answers to students' questions). Teachers' and students' talk was transcribed and both transcripts and videos were considered in conjunction for analysis. This procedure was followed in order to consider any visual and non-verbal information relevant to the understanding of communicative meanings and functions of talk as part of the analysis (e.g.,

giving time to students to think following a question, or using a caring and supportive tone of voice when giving feedback to students).

4.1.3.2. Coding schemes applied for analysis of teacher talk

In this subsection, the final versions of the two coding schemes used for the analysis of teacher talk together with the rationale underlying their design are presented. The case of teacher 'regulatory talk' is presented before that of teacher 'socio-motivational talk'.

4.1.3.2.1. Analysis of teacher 'regulatory talk'

Teacher 'regulatory talk' looked at the way teachers regulated student thinking surrounding learning activities in the classroom, both in terms of performance and content understanding. The analysis of 'regulatory talk' was based on research and theoretical literature related to social interaction and self-regulation. The final version of the coding scheme included three types of 'regulatory talk', namely *directive talk*, *guiding talk*, and *self-regulatory talk*. Each of these are explained below.

Directive talk referred to a type of teacher talk that directed students' thinking in a way that replaced students' own regulation of their thinking/activity for learning. This type of talk drew on research done both on teacher-student and student-student interactions. In particular, it drew on research looking at teacher-directed dialogue and teacher control of students' learning (Hadwin et al., 2005; Vauras, Kinnunen, Kajamies, and Lehtinen, 2013), as well as literature looking at the role of co-regulation – as an asymmetric regulation of one person over another (Panadero & Järvelä, 2015) – for self-regulation (Grau & Whitebread, 2012).

Furthermore, *guiding talk*, was a type of talk that assisted students' regulation of their own thinking or guided them in the expansion of their thinking. This type of talk drew strongly on literature about scaffolding of learning, such as literature looking at the role of adult guidance in children's development of thinking and self-regulation (see Díaz, Neal, and Amaya-Williams, 1990; Wertsch, 1979), and teachers assisting students in ways that are responsive to their zone of proximal development (see Hadwin et al., 2005; Turner and Fulmer, 2013).

Finally, *self-regulatory talk* was a type of talk teachers used to directly demand self-regulation from students while they were learning. Through this type of talk the teacher transferred to students the responsibility to regulate their own understanding and performance even when students asked for assistance. In particular, it drew on literature identifying the importance of aspects such as teacher questions, metacognitive demands or prompts to engage students in thinking metacognitively or express current understanding and reasoning (see Gillies and Boyle, 2006; Mercer and Littleton, 2007; Ornstein, Grammer, and Coffman, 2010; Perry, 2013). While the literature aided in determining the definitions of each type of talk, the specific indicators or

markers considered to operationalized such types of talk were grounded in the videoed lessons. Table 4.7 shows the final version of the coding scheme including definitions, indicators, clarifications and exclusions of indicators, and examples of teacher 'regulatory talk'.

As can be seen from Table 4.7, among the indicators chosen for *directive talk* were: asking symbolic questions that worked as teachers' commands or rhetorical questions; telling answers in response to questions asked by or to students; and strongly suggesting to students a particular way of doing something to a level that could be interpreted as giving a direction. All these were considered as teachers' interventions which had the function of replacing students' regulation of their own thinking or activity. Moreover, among those indicators of *guiding talk* were teachers' formulating guiding questions/feedback/demands adjusted to students' contributions[23] or understandings; offering to students' elaborations that expanded their own ideas and contributions; unpacking students' ideas in a way that pointed out the relevant elements of their contributions; and requesting back from students more ideas (omitted or additional ideas) related to their previous contributions. All these teacher communicative acts were considered to be teachers' interventions aimed to assist or expand students' trains of thought and performance. Lastly, there was only one indicator of *self-regulatory talk* considered, namely observing teachers demanding self-regulation or metacognition explicitly from students by asking them to engage in behaviours such as planning, evaluating, changing, checking or reflecting about own performance, ideas or learning.

Clarification and exclusions of what could be considered as part of a listed indicator or not were included in the coding scheme. These clarifications and exclusions were needed to aid the identification of each type of 'regulatory talk' in the challenging conditions that the "messiness" of the naturalistic classroom presented for the achievement of reliable analysis.

[23] Contributions included students' performance in learning tasks the teacher could consider.

Figure 4.7 Teachers' 'regulatory talk' coding scheme

Type of regulatory talk	Main defining aspects	Indicators	Clarifications and exclusions	Examples
Directive talk	• Teacher takes over the regulatory function of students' thinking (directs).	• *Asking symbolic questions:* guiding questions that are heavily leading towards a specific answer/decision. • *Giving (telling) answers* to questions/ problems/demands (either those formulated by the teacher or by students themselves). • *Strongly suggesting* a specific way of doing something.	They function as disguised directives. They seem prescriptions more than genuine questions. Or give only little –symbolic- choice to students. *General note: Directive talk does not include Interrogation-Response-Evaluation or Response-Evaluation sequences. It is not considered when part of initial activity instruction and its codification does not need to be in response to students' contribution.*	Directive question, obvious answer with symbolic choice: T. (sits down at a table, addresses the group) *So you need to first set the scene, where are we, we're in, on the stage or are we in his room? Where's he writing his diary?* Strong suggestion: T. *You are not writing a script, I am not looking for "Hello, my name is XX and I'm in the kingdom of whatever it was." OK, that's not what I'm looking for. The reporters will introduce themselves, then the (inaudible) introduces the Aztec, then the Az-, the Aztec questions, then they tell the audience about the different skulls, then the Spanish arrive. OK?*
Guiding talk	• Teacher helps students to think, guides their regulation of thinking, or helps them to unfold their own thinking. • Teacher adjusts guidance to students' understanding or performance.	• Adjusted *guiding questions, feedbacks, or demands* that are not "heavily leading" to a specific answer/decision. • *Elaborating about students' contributions*, suggesting different possibilities in relation to their contribution (leaving options open) OR simply gives examples that illustrate students' contributions. • *Unpacking students' ideas,* explaining to them (and peers around them) the relevant elements of their contributions. • *Requesting back more ideas* from students, specifically ideas or information related to their previous contribution (e.g. omitted or additional ideas along the same trail of thinking), furthering his/her thinking.	The questions/demands aim is to help the student to break down the complexity of a cognitive/production demand or support students' understanding/production by assisting their thinking function while considering their input. They may include tentative suggestions used as guidance. These are not just disguised directive suggestions (i.e. not giving(telling)/pushing for specific answers/ideas). They have to include more than just one suggested possibility. It may include suggesting one possibility but saying "this is just an example" or adding "or something like that". Elaborations are not just adding information on top of students' contributions or paraphrasing them, but elaborating about them. We do not code this when teacher is just paraphrasing student without adding any guiding element (e.g. omitted info) to its thinking. If teacher asks students to do the unpacking, code as 'self-regulatory talk'. Not asked because the teacher did not understand or did not hear the student, but asked as teacher guidance. *General note: Guiding talk is not coded for interventions or explanations that are not adjusted to students' contributions (contributions include performance). Adjusting to students can include simply reacting to their work. It does not consider superficial feedback that is not formative (summative judgements).*	Asking guiding question: T. *He's worried bullies are going to get him. Do you think he's happy?;* Guiding demand: T. What you've done there is actually very, very good, so well done. The only thing I would say, the way to use a full stop you need to follow it with a capital letter because that's the first thing on your checklist. Elaborating about students' contributions: T. (Teacher is explaining what a scene within a playscript is. A student asks if one can think of it as a beginning or buildup of the story.) *Yes, you can think of it like that but sometimes your beginning might have two scenes in it. OK, because you might be introducing all your characters. In different places or in different times of day before the problem happens. So you might have beginning, a bit of build up and a problem, or bit of buildup and a problem.* Unpacking students' ideas: (repeating an example given by a student of a descriptive stage direction) '*Swings out his sword'. 'Pender sees the dark cave and swings out his sword'. 'Angrily!' Sorry I forgot that adverb. OK, so that's an example of a really descriptive stage direction. And it's telling us where Pender is, OK? The dark cave. But it's also telling us what he's doing and how he's doing it. Swinging out his sword angrily, OK? Good.* Requesting back more ideas: T. That's all right, so you think what *** has written is good. Why do you think it was good? Write it down as a comment for him.
Self-regulatory talk	• Teacher transfers responsibility for the regulation of thinking to his/her students	• *Explicitly demanding self-regulation*, through questions or demands aimed to encourage students to think about or improve their own thinking/ performance. It includes demanding students' planning, reflecting, evaluating, changing, checking own work/ideas, or similar.	It differs from asking students to think based on previously expressed ideas or performance in the sense that this code only considers a demand to deepen rather than just add ideas to (or remember) previously expressed ideas. It may be better considered as thinking about own ideas or performance. *General note: This code can be applied to teachers' response to students' learning activity (which might not always be verbally expressed) as well as to teachers' demands preceding students activity, such as planning. It excludes fact based IRE type of sequences.*	Self-regulatory question/demand: T. *OK, so what we're going to talk about now is what different methods can we use to edit our work? OK so different methods. What different things can, have we done this year to edit our work, to check our work? Is there anything else you think you could do? And think about what works best for you.*

4.1.3.2.2. Analysis of teacher 'socio-motivational talk'

Teachers' 'socio-motivational talk' in the classroom was analysed in order to explore its importance for students' self-regulation. Drawing on the work of Turner et al. (2002), Linnenbrink (2005), and Patrick, Kaplan, and Ryan (2011) as well as a summary of classroom research in relation to goal orientations offered by Anderman and Anderman (2009), an initial list of different classroom aspects sustaining classroom motivational mastery and performance structures was generated. These were then matched to the themes found across participating students' responses to the interview questions exploring their goal orientations (presented previously). As a result, six types of 'socio-motivational talk' were identified as relevant: *talk for mastery*, *talk for performance*, *talk for self-efficacy*, *talk against self-efficacy*, *talk for collaboration*, and *talk for competition*. The definitions of these different types of 'socio-motivational talk' were based on previous literature and the thematic analysis conducted of students' interviews about their goal orientations.

Among those types of talk heavily shaped by previous literature were talk for mastery, performance, collaboration and competition. *Talk for mastery* included teachers' using errors to help students understanding, challenging students' thinking, promoting intellectual risk taking, and valuing student improvement. *Talk for performance* included focusing on the product rather than the process of learning, and devaluing student error, judging them or not using them as learning opportunities. *Talk for collaboration* considered teachers' promoting collaboration/joint goals, and condemning students' disrespect of classmates' ideas/performance. *Talk for competition* incorporated teachers' emphasising social comparison or competition between students, explicitly comparing students, and allowing students' disrespect of classmates' ideas/performance.

A good example of how these types of talk developed from previous literature is that of *talk for mastery*. This type of talk was strongly based on the teacher's motivational discourse labelled as 'focus on learning' by Turner et al. (2002), student 'recognition' identified in the TARGET framework by Epstein (1989 as presented in Anderman and Anderman, 2009), and the teacher's 'emphasis on understanding and improvement' as identified by Linnenbrink (2005). What Turner and colleagues understood as 'focus on learning' included teachers focusing on the process of learning, challenging students, viewing errors as constructive, and supporting persistence. Similarly, what Epstein understood as student 'recognition' included recognizing students' progress, effort and intellectual risk-taking. Finally, what Linnenbrink understood as 'focus on understanding and improvement' included valuing mistakes as indicators of areas of improvement. As can be seen in Table 4.6, the final version of *talk for mastery* considered most of these characteristics either directly or in adapted forms that fit the data, such as using errors

to help student understanding, challenging students' thinking or promoting their intellectual risk-taking, and valuing student improvement.

On the other hand, among those types of talk less influenced by previously identified categories were those of *talk for self-efficacy* and *talk against self-efficacy*. Their definitions were heavily inspired by two salient themes found across interviews exploring students' achievement motivational attitudes, namely students' drive for *feeling able* and *avoiding feeling unable* (see definition in Section 4.1.2.2.1.3, this chapter). While still incorporating aspects of teachers' discourse thought to promote positive and negative emotionality, caring or social support (e.g., using humour, reducing anxiety, communicating warmth or personal interest in students learning experiences) (Anderman and Anderman, 2009; Patrick et al., 2011; Turner et al., 2002), the two types of teacher talk analysed narrowed down such conceptualizations to emotionality only related to students' sense of competence.

Among those indicators of discourse emotionality borrowed from the literature which related to students sense of competence were the de-emphasis on students' accomplishments (Turner et al., 2002), and the communication of high expectations, confidence or respect for students' opinions (Anderman & Anderman, 2009; Patrick et al., 2011). Considering these indicators, the interview themes, and the video recorded Literacy lessons, *talk for self-efficacy* was understood as communicating confidence in students' abilities, and showing enthusiasm/valuing their ideas/performance. On the other hand, *talk against self-efficacy* was understood as communicating low expectations or disappointment in students' performance, and offering comments about students' work that could make students feel incompetent. Regardless of whether the definition of each type of teacher 'socio-motivational talk' was inspired by the literature or student interviews, the specific types of communications considered as their indicators were strongly pinpointed and grounded in the data to allow their reliable identification and measurement.

Table 4.6 Teachers' 'socio-motivational talk' coding scheme

Type of 'Socio-motivational' talk'	Main defining aspects	Indicators	Clarifications and exclusions	Examples
Talk for mastery	• Valuing errors and understanding.	• *Using students' error to help them understanding*: Explicitly uses information from conceptual or performance errors in order to build on and promote understanding/performance.	Excludes doubts and activity rules.	T. *So you might put in brackets ´sleeping´ so you were right with sleeping but not ´was sleeping.´ As soon as you put the word "was" before "sleeping" that makes it, it's already happened.*
	• Promoting intellectual risk taking.	• *Challenging student thinking*: Challenges the contribution of a student in a way that is helpful and promotes the improvement of an idea or performance of that same student.	It can include the expansion of an idea or performance – It does not include challenge of lack of contribution or doubts about the activity rules.	T. *(Students are writing play scripts) OK, that's fine, but if you imagine that this is being done on a stage, we're going to need people coming in and out, aren't we? So how can we break this up a little bit so we've got different scenes?*
	• Valuing improvement.	• *Talking about improvement:* Explicitly talks about students' progress/improvement, or the importance of improving.		T. *What I want you to do, not for very long, is I want you to swap your book with your partner and I want you to see, shhh, I want you to see if you can spot any mistakes, any areas of improvement. So you need to swap it with your partner, read it through.*
Talk for performance	• Devaluing errors.	• *Getting frustrated because of students' errors:* Errors or bad performance make teacher annoyed/disappointed/frustrated, as expressed through tone of voice. OR *Correcting without explaining.*		T. *(said with a tone of frustration) So many of you did not, just did not use capital letters, it was very annoying!*
	• Focusing on the product rather than the process of learning.	• *Telling answers to teacher questions:* Tells answers to own genuine (non rhetorical) questions, or tells students how the final learning product should be (more than guiding them) in order to facilitate successful/quicker completion.	Excludes answers to doubts about activity goals and rules. Excludes spelling corrections.	T. *It could be the wind, yes. So what could you, you could say the wind was howling like a wolf, was that, was that what you were going to say?*
		• *Using threats to drive performance:* Teacher uses threats to ensure good performance.		T. *Can you show me how to be sensible for the rest of the script work? Cos otherwise, I can take you off [the school trip] and you will not be involved with this.*
Talk for self-efficacy	• Communicating high expectations.	• *Promoting students' sense of competence explicitly*: Explicitly uses words that express confidence in student's learning capacities.	Does not need to be accompanied by positive tone of voice.	T. *(in reaction a students' work) See? I told you you could. You just need to concentrate.*
	• Showing clear enthusiasm/ value for students' ideas/ performance (may make child feel proud).	• *Using students' work as examples* of good performance. • *Teaching the idea of one student to other students* (i.e. referring to a student's idea including explanation or clarification of the idea to others). • *Letting a student know how good their input is* explaining explicitly what was effective of it. • *Being extremely enthusiastic about a student's idea/performance* (through tone of voice).	The code excludes short praise-like expressions (such as "good" "very good", "exactly") unless teachers are extremely non-verbally enthusiastic about it.	T *(reads student's work) Wow! Do you want to read this out loud [to the class]?* T. *Good, great start! I really like that bit, "haunted and spooky like the devil's eye." Really good start. I'm really impressed, young man.*
Talk against self-efficacy	• Making students feel less competent.	• *Commenting in students mistakes in a damaging way:* Teacher comments incorrect, irrelevant or bad quality student's work/ learning in a way or tone of voice that may make students feel less able in respect to past, present or future learning.		T. *All right, can I see what you've written, please, both of you.(reads their work) What am I going to do about your spelling?!*
		• *Communicating disappointment in students' ideas/performance:* Teacher communicates disappointment in one or various students as learners.	Tone is important, it might make child feel bad.	T. *You're the only one who seems to be going on about this. I've spoken to you about this, you settle down. I'm not particularly impressed with you.*
Talk for collaboration	• Promoting collaboration/joint goals/mutual respect of ideas/performance	• *Promoting collaboration/joint goals/mutual respect of ideas.*		T. *So just with the person next to you write on your [little] whiteboards, try and think of some alliteration to do with the house.*
		• *Promoting respect and condemns disrespect for each other's ideas/ performance.*		T. *OK. this group. OK, so tell the class what went well, what worked well [in your partner's story]?*
Talk for competition	• Promoting or allowing competition	• *Promoting learning competitions between individuals.* • *Explicitly comparing students with one another.* • *Not condemning damaging comments from peers about a student's idea/performance.*		T. (Children are writing scripts of little sketches. Teacher asks if any student would like to help acting out for the class the part of an 'idiot bully'. After two children volunteer, teacher says): *No, no, next time Hillary, Donald is a better idiot than you, sorry.*

4.1.3.2.3. Analytical procedures and reliability of teacher 'regulatory talk' and 'socio-motivational talk'

The coding of teachers' 'regulatory talk' and 'socio-motivational talk' was based at the analytical level of communicative acts within each teacher speech turn. Communicative acts were considered to start and finish when the people interacting or the focus of the interaction changed. Focusing the analysis at the level of the communicative act allowed achievement of a more precise picture of teachers' communicational interactions across different social units and functions/intentions of teaching-learning interaction (Hennessey et al., 2016). In relation to the focus of analysis, 'regulatory talk' was only considered when teachers and students communicated regarding thinking for understanding and performance. This was done because 'regulatory talk' was studied with the purpose of examining its relevance for self-regulation of thinking and activity. Additionally, given that 'socio-motivational talk' was also studied to explore its relevance to students' self-regulation, it was considered when it occurred in any talk surrounding students' achievements or thinking, not when teachers were managing behavioural issues unless related to learning engagement.

Coding was carried out independently for each type of talk, with all lessons coded for 'regulatory talk' before 'socio-motivational talk'. 'Regulatory talk' and 'socio-motivational talk', were allowed to co-occur within the same communicative act. This was allowed because teachers could also afford students' motivation for learning while regulating students' thinking (e.g., when teachers ask students to think again about their answers they could be promoting both self-regulation and the value of mastery). Coding was also exhaustive at the level of speech turns, with each teacher speech turn coded as containing or not containing evidence of particular types of 'regulatory talk' or 'socio-motivational talk'. It is important to note, however, that coding was not exhaustive at the level of communicative acts. If a speech turn contained only one or two relevant communicative acts among various irrelevant ones, only the relevant communicative acts were coded. Coding categories were also mutually exclusive within each dimension of talk, with only one type of 'regulatory talk' or 'socio-motivational talk' allowed to be coded in a single communicative act. More than one code from the same coding scheme was assigned to a single speech turn only when the different codes could be identified in different communicative acts.

562 teachers' speech turns equivalent to a representative 11.59% of the whole data set (4849 turns) were coded/rated independently by two raters to establish robustness of the coding schemes of 'socio-motivational talk' and 'regulatory talk', respectively. Teacher discourse was pre-segmented according to teacher 'interactive-turns'. That is, teacher speech turns directed at one student, a group of students, or the whole class, with a change in segments when the addressee of teacher talk altered. The predefinition of segments was decided following the

difficulty that other studies have had in agreeing on the starting and finishing points of units given the messiness of classroom discourse (Hennessey et al., 2016). Moreover, this type of theoretical decision when defining units of analysis of observational tools is considered good practice especially when the units of analysis are more inferential given their stronger social rather than behavioural nature (Bakeman and Quera, 2011). In the case of this study, such a decision followed the focus given to social interactions, and the importance given to inter-mental activity for self-regulation within the literature (Section 2.2.5 and 2.2.6). Cohen's Kappa was used to calculate reliability, as it allowed to correct by the possibility of raters agreeing by chance in the assignation of categorical codes (Bakeman & Quera, 2011). Inter-rater reliability levels were good for the analysis of the 6 types of teachers' 'socio-motivational talk' (and 1 non-relevant code) (Cohen's Kappa= 0.715) and very good for the of analysis of the 3 types of 'regulatory talk' (and 1 non-relevant code) (Cohen's Kappa= 0.825).

4.2. Preparing the data for statistical analysis

4.2.1. Data sets and measurement units

Three different types of data were used for the statistical analyses carried out within this thesis: children's self-regulatory behaviours and task performance; children's expression of ideas indicative of 'achievement motivational attitudes' within their interviews, and; teacher 'regulatory talk' and 'socio-motivational talk' within Literacy lessons in the classroom. All these data sets used different measurement units. Children's self-regulatory behaviours, task challenge, and task accuracy were measured using 4-point ordinal scales (where 4 indicated the highest score and no score was granted when the scale was non applicable[24]). Children's expression of 'achievement motivational attitudes' were measured in terms of frequency (with zero indicating no expression and repeated ideas excluded in order to avoid overrepresentation). The different types of teacher talk were measured in terms of the percentage of teacher turns containing evidence of the given type of talk over the total amount of identified teacher turns. Percentages of teacher talk were used instead of raw frequencies in order to control for differences in the total amount of teacher talk found between participating teachers.

4.2.2. Data aggregation

Some data were aggregated before conducting some of the statistical analyses to answer the different research questions of this thesis. This was the case for children's scores of self-regulatory behaviours and task performance; the only type of data including repeated measures

[24] For example, when children did not make any errors, the scale of *learning from errors* was not applied.

per participant in this study (11 to 13 times). The aggregation of this data was done by averaging the different scores granted to children for each behavioural scale across the 11 to 13 tasks. However, it is important to note that not only aggregated but also disaggregated values of these scores where used depending on the type of analysis conducted. Specifically, the disaggregated values were used when the focus of analysis was at the level of behaviours themselves (e.g., when examining the functions of these behaviours within each cultural context). On the other hand, the aggregated values of these scores were used when the interest was at the level of individuals (e.g. when examining the predictive role of classrooms on students' individual levels of self-regulatory behaviours). There were no other types of aggregated or disaggregated data.

4.2.3. Addressing potential bias

Among the analyses carried out were differences between country samples in terms of levels of self-regulatory behaviours and task performance (disaggregated values) as well as adoption of 'achievement motivational attitudes'. Exploratory factor analyses were also conducted to explore factors underlying self-regulatory behaviours (disaggregated values) within each country sample. Predictive relationships were examined between self-regulatory behaviours (disaggregated values) and task performance; children's motivational attitudes and self-regulatory behaviours (disaggregated values); and teacher talk and children's self-regulatory behaviours (aggregated values).

Before the analyses were carried out, the assumptions behind the statistical procedures were tested and addressed to reduce potential bias in the statistical outcomes. Shapiro Wilk tests of normality showed that various aggregated and disaggregated versions of the ratings of children's self-regulatory behaviours and task performance did not meet the assumption of normal distribution within either country sample[25] (see Appendix 5.1). A similar problem was found for the case of achievement motivational attitudes[26] (see also Appendix 5.1). Following these issues, most statistical analyses were conducted using non-parametric tests. These types of tests were instrumental as they allowed not only analyses using non normally distributed data but also analyses in which data was ordinal in nature, such as the disaggregated versions of

[25] The aggregate measures violating the assumption of normality included asking for clarifications, asking for help, concentration, maintaining motivation, and final task accuracy. The disaggregated versions that violated this assumption in either country sample were awareness of errors, planning during (order), effective control of problems, use of building strategies, asking for clarifications, evaluation, concentration, maintaining motivation, effort, asking for help, and final task accuracy.

[26] Among these attitudes only the orientations of effort approach and performance approach, the motives of learning and relating to others, and the goal oriented motive of effortful learning approach driven by learning did not violate the assumption of normality in both country samples.

the 4-point scales used to observe children's self-regulatory behaviour and the frequency of expression of ideas indicative of motivational attitudes within children´s interviews.

Levene's tests were carried out to check homogeneity of variance between country samples — an assumption which needs to be met in order to use non-parametric tests to examine differences in variable levels between samples. Aggregated versions of children's behavioural scores and frequency of expression of ideas related to motivational attitudes proved to distribute similarly across country samples, with only a few exceptions[27] (Appendix 5.2.1). But given that both samples were of similar size, violations to this assumption were considered to be unlikely to bring negative consequences to the statistical outputs (Field, 2009).

Some other assumptions were checked to ensure that predictive relationships between self-regulatory behaviours and task achievement as well as between children´s motivational attitudes and self-regulatory behaviours were accurate. Issues of multicollinearity among predictor variables (self-regulatory behaviours and attitudes) were discarded by examining correlation matrices, VIF values (all below 5) and tolerance statistics (all above 0.2) (see Appendix 5.2.2) – the strongest correlation among predictors was $r_{(213)}=0.54$, $p<0.05$, found in England and between two children's self-regulatory behaviours. Multinomial regressions were tested following the violation of the assumption of proportional odds required by ordinal logistic regressions offering more simple interpretations. The results of the Hausman-McFadden test demonstrated that the assumption of independence of irrelevant alternatives was met for all multinomial regressions (see Appendix 5.3.1).

For the case of exploratory factor analyses (EFAs) a subsample of all observations per country (161 from Chile, and 147 from England) was used after a listwise deletion of missing values (applied to maximize the use of relevant covariance). Bartlett test of sphericity indicated the data from the complete observations were unlikely to come from an identity matrix in Chile ($\chi2_{(45)}=297.49$; $p=0.000$) or in England ($\chi2_{(45)}=276.86$; $p=0.000$), justifying the use of EFAs in both samples. KMO levels showed the sizes of the Chilean sample (KMO=0.608) and English samples (KMO= 0.735) were acceptable for EFAs. No multicollinearity problems were found within either country sample (Determinant value: 0.148 and 0.142, respectively), but the assumption of multivariate normality was violated in the Chilean (Doornik-Hansen $\chi2_{(34)}$ = 8113.4 $p>\chi2 = 0.000$) and English samples (Doornik-Hansen $\chi2_{(34)}$ = 2305.6 $p>\chi2 = 0.000$). Therefore, maximum likelihood (Fabrigar & Wegener, 2012) and asymptotic distribution free methods were applied to carry out the factor analyses (Flora & Curran, 2004).

[27] The only behaviours showing differences of variance between country sampled were those of planning before ($W_0= 4.208$; $p=0.046$) and asking for help ($W_0= 6.00$; $p=0.018$). Children frequency of expression of achievement motivational attitudes also showed to distribute similarly between samples, with only effort approach driven by performing high(er) ($W_0= 15.75$; $p=0.000$) and performance avoidance driven by either learning ($W_0= 13.19$; $p=0.001$) or performing high(er) ($W_0= 9.51$; $p=0.003$) being the exceptions.

Finally, only some assumptions were checked for multilevel regressions. That is because, according to Rabe-Hesketh and Skrondal (2012), neither the multilevel assumptions of mean structure nor covariate structure need to be met with small samples. Similarly, the authors consider that the assumption of normality of intercepts and normality of model residuals within each cluster are not requirements when the interest lies in the calculation of fixed rather than random effects within a multilevel model, as in this study. Therefore, only homoscedasticity and linearity assumptions were checked. The tests conducted showed that some predictive models presented problems of heteroscedasticity (Appendix 5.4.1). Nevertheless, post-hoc computations of the same models estimating robust standard errors instead (consistent under heteroscedastic conditions) confirmed the results obtained in the original regressions (Appendix 6.2). The only exception to this corroboration was the relationship between *talk for self-efficacy* and *maintaining motivation*, which became non significant when applying robust standard errors.

The assumption of linearity was checked by plotting residuals of the model against predicted values of outcome variables. The assumption was met only by those regressions establishing relationships between teacher talk and children's *planning before* (Appendix 5.4). As this was the only self-regulatory behaviour found to vary according to classrooms which measure distributed normally, data transformations were applied to the other relevant outcome measures to attempt meeting the linearity assumption. Data transformations were unable to rectify normality violations, and hence linearity violations either. Given the exploratory nature of the study, and that other similar published studies tend not to report multilevel regression assumptions (e.g., Bottge et al., 2015; Frenzel, Pekrun, and Goetz, 2007; Trobst, Kleickmann, Lange-Schubert, Rothkopf, and L, Moller, 2016) – possibly due to the difficulty of meeting them – all statistically significant predictive relationships found within multi-level models are reported, but should be interpreted with caution.

This chapter has introduced the different analytical tools and procedures used to transform open ended qualitative data (interview answers, children cube assembly behaviours, and teachers' classroom discourse) into numbers. In doing so, the chapter has shown how qualitative data can be reduced in ways that are not only reliable but also culturally appropriate, and which therefore allowed for more valid cultural comparisons than other closed-ended methods could have done. The chapter has also presented how the data were prepared and scrutinized to ensure the accuracy of the final statistical analyses carried out to answer the research questions of this study. The following three chapters present the results of the eight research questions explored to understand the *culturally adaptive functionality* of self-regulation, including its behavioural strategies and underlying motivational attitudes.

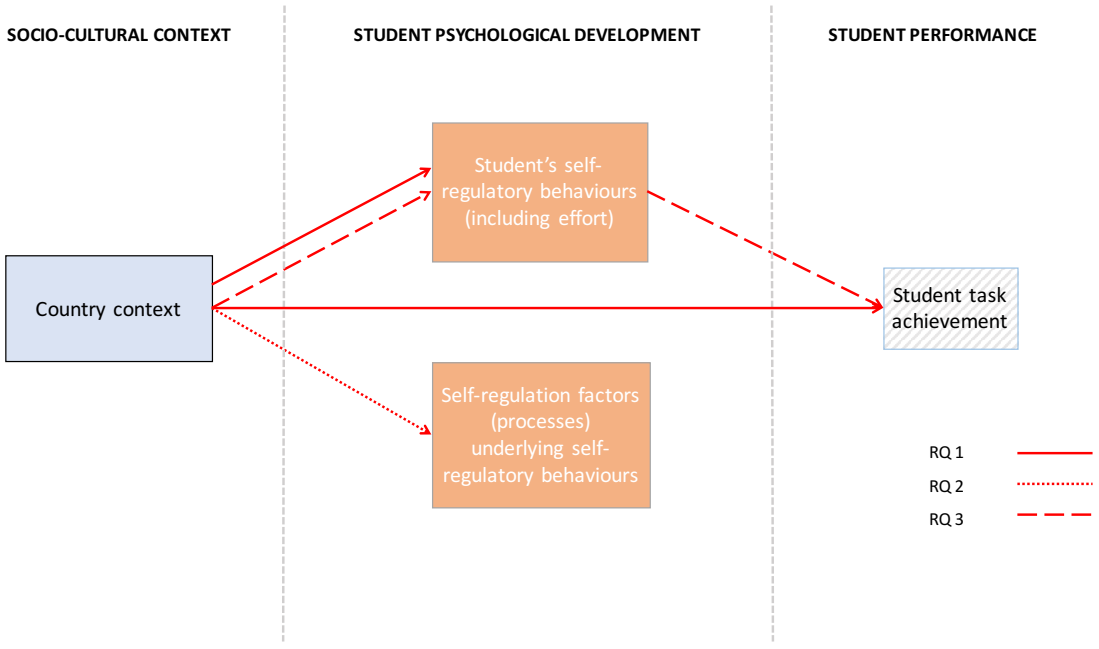
5. FINDINGS I. SELF-REGULATORY BEHAVIOURS AND THEIR RELATIONSHIP TO CULTURE

The findings of this thesis are presented in three chapters. This chapter focuses on exploring the relationship between countries' cultures and students' self-regulation. The subsequent findings chapter is dedicated to studying the relationships between country culture and student 'achievement motivational attitudes' relevant for self-regulation. The third, and final, findings chapter explores the relevance of classroom education cultures, in particular their regulatory and motivational characteristics, for self-regulation. For a reminder of the different research questions, data collected and analyses carried out to answer them please refer to Table 3.3 (Section 3.4).

To elaborate further, this particular chapter focuses on exploring the importance of countries' cultures for students' self-regulation. To explore the national level, the behaviours of 8 to 9 year-old Chilean and English students were compared in relation to: i) the extent to which they were engaged in each country; ii) the psychological factors underlying these self-regulatory behaviours in each cultural context; and iii) the productive pragmatic functions these self-regulatory behaviours (and by proxy the self-regulation psychological factors they represent) had for task achievement in each country sample.

A general overview of the different types of variables involved in this chapter, the level to which they were considered, and the relationships explored can be seen in Figure 5.1.

Figure 5.1 Summary of relationships explored between country culture and self-regulation



As can be seen from Figure 5.1, what is ultimately explored throughout this chapter's enquiry is the role that the country cultural context played in self-regulation (behaviours and psychological processes) and task achievement, as well as the functionality of self-regulation (behaviours and associated psychological processes) for task achievement. The following research questions guided this chapter's enquiries. They are ordered sequentially from more general to more specific.

R.Q.1. *Do the self-regulatory behaviours and related levels of task achievement of 8 to 9 year-old Chilean and English students vary in extent across countries? If yes, how?*

R.Q.2. *Do the self-regulatory behaviours of Chilean and English 8 to 9 year-old students differ in the underlying self-regulatory factors (processes) they represent? If yes, how?*

R.Q.3. *Do the same specific self-regulatory behaviours relate to levels of task achievement in both Chilean and English 8 to 9 year-old students? If not, which ones are most related to task achievement in each group?*

In the following sections the results for each of the research questions above is reported. These have been answered by conducting statistical analysis in relation to students' self-regulatory behaviours and task achievement measured through observational methods (Section 4.1.1). Before addressing each research question, descriptives of the variables of interest are presented for both country samples.

5.1. Descriptives of self-regulatory behaviours and task achievement

Descriptive information regarding the researched self-regulatory behaviours is presented by country. The objective of this descriptive analysis was to check for any potential characteristics of the data that may help/obstruct further statistical contrast and estimations. Therefore, full descriptive information is presented, but only commented on in relation to anomalies in levels of presence and variability towards the end of the section.

Table 5.1 shows the mean, standard deviations and number of observations of self-regulatory behaviours by country. All scales were applied to the 315 and 301 times English and Chilean students were observed carrying out the tasks selected for the study, respectively. Some scales, such as *effective control of problems*, *learning from errors* and *awareness of errors*, were not applicable when students did not make any errors throughout the task. *Evaluation* was not applicable in the few occasions students opted to not finish the task. These behaviours, therefore, were rated fewer times.

Table 5.1 Summary of descriptives of self-regulatory behaviours: Chilean and English students

Country	England			Chile		
Self-regulatory behaviour	Mean	Std. Dev.	N observations	Mean	Std. Dev.	N observations
Planning before	2.93	0.85	315	2.93	0.83	301
Planning during (order)	3.43	0.82	315	3.35	0.83	301
Effective control of problems	3.48	0.93	215	3.24	1.01	229
Learning from errors	2.20	0.84	169	2.27	0.82	170
Use of building strategies	1.58	0.68	315	1.62	0.67	301
Use of model	3.17	0.85	315	3.14	0.86	301
Monitoring	2.83	1.02	315	2.86	0.99	301
Awareness of errors	3.17	1.08	206	2.91	1.15	213
Evaluation	2.24	1.05	308	2.25	1.03	296
Concentration	3.93	0.27	315	3.97	0.20	301
Maintain motivation	3.92	0.40	315	3.91	0.44	301
Effort	1.74	0.91	315	1.72	1.01	301
Asking for help	1.07	0.29	315	1.13	0.38	301
Asking for clarifications	0.13	0.38	315	0.09	0.35	301

Table 5.2 shows the level of task achievement (*final task accuracy*) across students from Chile and England. It also shows by country the *level of challenge* students seemed to have encountered in each of the tasks they carried out.

Table 5.2 Descriptives task achievement and challenge: Chilean and English students

Country	England			Chile		
Indicators	Mean	Std. Dev.	N observations	Mean	Std. Dev.	N observations
Final task accuracy	3.40	1.04	315	3.23	1.11	301
Level of challenge	2.71	0.86	315	2.54	0.84	301

5.1.1. General characteristics and anomalies in the data

Most self-regulatory behaviour averages were found to be closer to the 2.5 median of a 1-4 scale, all being within the 1.58 to 3.43 range. There were, however, some exceptions that showed ceiling and floor effects. *Concentration* and *maintaining motivation* demonstrated a ceiling effect, with their averages being close to the top of the 4-point scale (all above $\bar{x}$= 3.90). On the other hand, floor effects could be found in both country samples only for variables such as *asking for clarifications* ($\bar{x}$= 0.09 and $\bar{x}$=0.14 per country) and *asking for help* ($\bar{x}$= 1.07 and $\bar{x}$=1.13 per country). These averages were close to the bottom of their respective measurement scales (i.e. zero and one). The low levels of these behaviours, nevertheless, could be explained by the fact

that children tended to ask questions only during the first of the 11 to 13 tasks each of them carried out.[28]

In terms of variability, the self-regulatory behaviours showing lower variability were also *asking for clarifications, asking for help*, *concentration*, and *maintaining motivation*. All of these were found to have standard deviations ranging between 0.20 and 0.44 across both country samples. For the case of measures of *final task accuracy* and *level of challenge*, country averages ranged between 2.54 and 3.40 point on their respective 1 to 4 measurement scales. They showed standard deviations ranging from 0.84 to 1.11 SD points. All variability measures were considered to be adequate in data measured using 1 to 4 point scales, with *concentration* being less varied (SD=0.20 and 0.27 per country) and therefore requiring closer monitoring throughout analytical procedures than the rest.

5.2. Results

In this section, results of the explorations guided by each research question are presented.

5.2.1. RQ1. Do the self-regulatory behaviours and related levels of task achievement of 8 to 9 year-old Chilean and English students vary in extent across countries? If yes, how?

This first research question explores differences and similarities in self-regulation behavioural strategies across countries. Given the marked differences in the educational traditions followed by these two countries, the results found in relation to this question may be considered a preliminary exploration of whether or not educational cultures make a difference to self-regulation for the sampled students. This would only, however, remain an inference.

Considering violations of normal distributions (Section 4.2.3), a Mann-Whitney U test for two independent samples was conducted considering all the 301 observations collected from the 24 Chilean students, and 315 observations collected from the 25 English students. Results shown in Table 5.3 indicate that the vast majority of the self-regulatory behaviours considered were applied to similar levels in Chilean and English students. Nevertheless, some core self-regulatory behaviours representing effective metacognitive monitoring and effective metacognitive control differed across country samples. Specifically, these included *awareness of errors,* and *effective control of problems*. English students showed higher levels of *awareness of errors* – an indication

[28] *Asking for clarification* was directed to resaerchers by children to understand the rules and aims of the tasks, as these were always the same across tasks, on average children asked them very infrequently. The case of *asking for help* was similar, as everytime the children asked the researcher for such executive or dependency-oriented help, he had to let the children know he could not actually give them any answer or guidance, lowering the frequency of these questions.

of effective metacognitive monitoring - (U=19,109, p=0.013) and *effective control of problems* – an indication of effective metacognitive control - (U=21,096.5, p=0.002). The level to which students applied the of *asking for help* also varied across countries. Chilean students showed a higher level of *asking for help* (U=45,063.5, p=0.030).

Table 5.3 Mann-Whitney U test - Differences between Chilean and English samples in self-regulatory behaviours

Self-regulatory behaviour	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Planning before	47146.50	-0.13	0.900
Planning during (order)	44233.50	-1.62	0.105
Effective control of problems	21096.50	-3.06	**0.002***
Learning from errors	13649.00	-0.84	0.399
Use of building strategies	45354.50	-1.04	0.301
Use of model	46708.50	-0.34	0.733
Monitoring	46700.50	-0.34	0.738
Awareness of errors	19109.00	-2.48	**0.013***
Evaluation	45227.50	-0.18	0.860
Asking for clarifications	44518.00	-1.91	0.056
Asking for help	45063.50	-2.17	**0.030***
Concentration	45966.00	-1.81	0.070
Maintain motivation	47374.00	-0.04	0.967
Effort	45256.00	-1.09	0.278

*Significant differences between countries (p< 0.05), also in bold.

More details including the mean, standard deviation and frequency for each of these behaviours found to differ between the Chilean and English sample can be seen in Table 5.4 below.

Table 5.4 Descriptives of significantly different self-regulatory behaviours across Chilean and English students

Country	England			Chile		
Self-regulatory behaviour	Mean	Std. Dev.	N observations	Mean	Std. Dev.	N observations
Effective control of problems	3.48	0.93	215	3.24	1.01	229
Awareness of errors	3.17	1.08	206	2.91	1.15	213
Asking for help	1.07	0.29	315	1.13	0.38	301

The two countries studied also showed significant statistical differences in relation to level of performance and faced challenge (see Table 5.5). Specifically, English students achieved a higher level in *final task accuracy* than their Chilean counterparts (U=43204, p=0.023). English students also demonstrated actions indicative of facing higher challenge than Chilean students (U=41495.5, p=0.004).

Table 5.5 Mann-Whitney U test - Differences between countries in task performance and challenge

Indicators	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Final task accuracy	43204.00	-2.28	**0.023***
Level of challenge	41495.50	-2.85	**0.004***

*Significant differences between countries (p< 0.05), also in bold.

Table 5.6 offers a reminder of the descriptives of these two measures of performance across country samples.

Table 5.6 Descriptives task achievement and challenge: Chilean and English students

Country	England			Chile		
Indicators	Mean	Std. Dev.	N observations	Mean	Std. Dev.	N observations
Final task accuracy	3.40	1.04	315	3.23	1.11	301
Level of challenge	2.71	0.86	315	2.54	0.84	301

5.2.1.1. Summary

In summary, the two country samples differed in levels of self-regulatory behaviours indicative of the key self-regulatory processes of effective metacognitive monitoring and metacognitive control. Specifically, lower level of *awareness of errors* and *effective control of problems* were found in the Chilean sample. Furthermore, *asking for help* was a strategy applied with more frequency by students in Chile than in England. Tasks seemed to be considered as less challenging by Chileans, who, however, underperformed compared with their English counterparts in *final task accuracy*.

Analysing differences in the levels of certain self-regulatory behaviours across country samples helped to provide initial insights into the role of culture for self-regulation. Such an exploration, however, does not provide information about the extent to which these particular behaviours could be considered to represent equivalent self-regulatory processes in the mind of Chilean and English students, or indeed assist personal performance. A different type of analysis is therefore needed to assess if particular behaviours carried out by children while engaged in a task do or do not take culture-specific self-regulatory and pragmatic functions. The remaining two research question reported within this chapter focus on carrying out such functional analyses as part of an attempt to explore the thesis about the *culturally adaptive functionality* of self-regulation.

5.2.2. RQ2. Do the self-regulatory behaviours of Chilean and English 8 to 9 year-old students differ in the underlying self-regulatory factors (processes) they represent? If yes, how?

To explore this question, an Exploratory Factor Analysis (EFA) was conducted separately for the Chilean and English sample. By extracting factors underlying the different self-regulatory behaviours, it was expected to be able to determine the different self-regulatory processes these behaviours represented in students from each country sample. As there are many different ways of conducting an EFA, the method and rationale followed are presented before showing the results.

5.2.2.1. Factor analysis procedures

In order to carry out the EFAs, factors were extracted from the polychoric correlation matrix rather than directly from the rating values due to the ordinal nature of the applied observational scales (Field, 2009). Self-regulatory behaviours with high levels of skewness and kurtosis (Appendix 5.1.2) were excluded from the analysis to avoid imprecisions that these types of variables could bring in factor analysis run over non-normally distributed data and polychoric matrices (Flora & Curran, 2004). Following these criteria, behaviours related to the level of sustained motivation (*maintaining motivation* and *concentration*) and social self-regulation strategies (*asking for clarifications* and *asking for help*) were not part of the analysis. Consequently, the extracted factors could only be understood as a reflection of self-regulatory behaviours related to independent cognition (e.g. *awareness of errors*, *planning before*, *use of building strategies*) and not related to socially assisted self-regulation. Moreover, the interpretation of the extracted factors also need to consider that persistence (i.e. *effort*) was the only measure of a motivational dimension of self-regulation included. A listwise deletion of incomplete cases was followed to maximize the use of relevant covariance among all observed behaviours. Following this deletion, 147 and 161 observations were considered as part of the English and the Chilean sample, respectively.

To determine the appropriate number of factors to extract through the EFA for each country, a root mean square error of approximation (RMSEA) was calculated. This method has been regarded by Fabrigar and Wegener (2012) as more adequate than the customarily used examination of the eigenvalues scree plot to determine the most appropriate number of factors to extract in sample sizes lower than 200, as was the case here. Considering the moderate non-normality of the self-regulation data, a maximum likelihood method of extraction, pondered to be robust to medium levels of skewness and kurtosis (Fabrigar & Wegener, 2012), was conducted to calculate the goodness of fit of 1-factor to 6-factor solutions models. As RMSEA values closer to zero indicate a better model fit, it was possible to determine that a 5-factor

solution was the most adequate for both the Chilean and English samples. RMSEA values are shown in Table 5.7.

Table 5.7 Factor model goodness of fit according to number of extracted factors: Chilean and English samples

Country	Number of factors extracted	Chi-square	df	N obsevations	RMSEA value
England	6	———Saturated model———			
	5	8.7	5	147	**0.071***
	4	25.83	11	147	0.096
	3	52.44	18	147	0.114
	2	84.67	26	147	0.124
	1	154.35	35	147	0.153
Chile	6	———Saturated model———			
	5	6.7	5	161	**0.046***
	4	28.68	11	161	0.100
	3	72.07	18	161	0.137
	2	133.52	26	161	0.161
	1	269.99	35	161	0.205

*RMSEA closer to zero indicating most adequate number of factors to be extracted per country.

5.2.2.2. Factor solutions

Oblique rotations (promax with kaiser on) were applied to non-rotated solutions in order to aid interpretation of factors expected to correlate with each other (J.-O. Kim & Muller, 1978). Given the relatively small number of observations per country, only loadings above an absolute score of 0.4 were considered relevant (Stevens, 2002) and are therefore displayed in the final rotated factor solutions in Table 5.8 and Table 5.9. Please note that, given that factors were assumed to correlate, the proportion of variance of self-regulatory behaviours explained by all factors within each country does not add up to 100%.

Table 5.8 Factor matrix, rotated - English students (loadings >0.4 displayed)

Self-regulatory behaviour	Factor 1 ***Effective control***	Factor 2 ***Strategic thinking***	Factor 3 ***Effective monitoring***	Factor 4 ***Orientation***	Factor 5 (***Effortful) monitoring***	Uniqueness of behaviour
Factor variance explained *(40.30% average across factors)*	66.45%	43.71%	35.53%	31.02%	24.80%	-
Effective control of problems	0.7209					0.2045
Learning from errors	0.8045					0.4627
Planning during (order)	0.8178					0.3108
Planning before		0.6822				0.7066
Use of building strategies		0.4354				0.6163
Awareness of errors			0.4512			0.4925
Use of model				0.6231		0.6646
Monitoring					0.6187	0.6217
Evaluation					0.5205	0.6149
Effort					0.4252	0.4951

Note: Matrix calculated based on 147 observations after listwise deletion of incomplete cases. Oblique promax rotation with kaiser correction applied.

Table 5.9 Factor matrix, rotated - Chilean students (loadings >0.4 displayed)

Self-regulatory behaviour	Factor 1 ***Effective monitoring-control***	Factor 2 ***Organisation***	Factor 3 (***Effortful) monitoring***	Factor 4 ***Non strategic orientation***	Factor 5 ***Strategic thinking***	Uniqueness of behaviour
Factor variance explained *(30.48% average across factors)*	49.89%	35.46%	31.19%	19.08%	16.67%	-
Effective control of problems	0.6707					0.4492
Learning from errors	0.7800					0.2895
Planning during (order)		0.6066				0.5314
Planning before					0.4813	0.7206
Use of building strategies				-0.4135	0.4418	0.5235
Awareness of errors	0.8459					0.2605
Use of model				0.5863		0.6855
Monitoring			0.8007			0.4174
Evaluation						0.8311
Effort			0.5423			0.3156

Note: Matrix calculated based on 161 observations after listwise deletion of incomplete cases. Oblique promax rotation with kiser correction applied.

5.2.2.2.1. Similarities across country samples in self-regulatory factors

From the rotated solutions, it is possible to say that there are important similarities as well as differences in how self-regulatory behaviours clustered in the two country samples. Among the similarities was an important part of the extracted 'Factor 1', which included *effective control of problems* and *learning from errors* in both country samples. These two behaviours reflected effective metacognitive control, because combined they represent a student fixing a mistake appropriately and controlling in order not to repeat it. 'Factor 1', however, was labelled differently between samples given subtle differences between countries. For the case of Chile, it was labelled as 'effective monitoring-control' because of its inclusion of *awareness of errors*, a behaviour indicating effective metacognitive monitoring. On the other hand, this factor was labeled as *effective control* within England because of its inclusion of *planning during (order)*, a measure reflecting controlling the execution of a task in an orderly manner, which in turn could be interpreted as the deployment of a plan. In both countries, 'Factor 1' explained the highest amount of variability of self-regulatory behaviours (66.45% in England and 49.89% in Chile).[29]

Another similarity across countries was the emergence of the factor labelled as 'strategic thinking', composed by *planning before* and *use of building strategies*. This factor indicated the self-regulatory function of thinking about ways of carrying out a task. Finally, the third similarity in mental functionalities was represented by the extracted factor labelled as '(effortful) monitoring' (or simply 'monitoring' as this process could be considered effortful by definition), which included the behaviours of *monitoring* and *effort*. This factor indicated students pausing to think about their progress, especially when trying to re-do a part that was proving to be difficult for them. There were, however, some differences across country samples in relation to some of these and other factors which are explained in the next subsection.

5.2.2.2.2. Differences across country samples in self-regulatory factors

As mentioned before, 'Factor 1' showed some differences in terms of the third behaviour constituting it across the two samples. This difference brought some relevant consequences to the factor solutions across samples. Specifically, when *awareness of errors* and *planning during (order)* did not form part of Factor 1, these behaviours tended to form their own factors. This resulted in the Chilean sample including an 'organisation' factor –indicated by *planning during (order)* - and the English including an 'effective monitoring' factor – indicated by *awareness of errors*.

[29] The extent to which 'effective control' was able to explain most of the variability of self-regulation within England could be due to the fact that, at least theoretically, in order to engage in metacognitive control one must also engage effectively in metacognitive monitoring.

To double check whether or not the four behaviours that loaded into Factor 1 across the two country samples could have alternatively loaded as part of one 'effective self-regulation' factor formed of all four variables (*awareness of errors*, *learning from errors*, *planning during (order)*, and *effective control of problems*), a Confirmatory Factor Analysis (CFA) was applied. This analysis was carried out using an asymptotic distribution free method (also known as weighted least squares), considered more adequate for ordinal data not meeting the assumption of multivariate normality (Flora & Curran, 2004) (see report of multivariate normality in Section 4.2.3). The results of this analysis suggested that productive self-regulation with the four hypothesized behaviours could be considered a similar solution to one with three behaviours only for the English case (RMSEA 0.000 for the solution with both number of variables, but a higher estimated upper bound of 0.145 in RMSEA confidence interval for the four variable model), and a worse solution for the Chilean case (RMSEA 0.051 with four variable model and 0.000 with three variable model) (see factor solution in Appendix 6.1). Following these measures of model fit, the three variable solution, previously presented in Table 5.8 and Table 5.9, were considered a better and more parsimonious model for both countries. Therefore, while a factor of 'effective monitoring-control' was extracted for the Chilean sample, a factor of 'effective control', separate from 'effective monitoring' was extracted for the English sample.

Additionally, it was possible to see another relevant difference between samples when examining the *evaluation* behaviour. This behaviour seemed not to be related at all to self-regulation for the case of Chile, with a very high level of uniqueness in relation to all other studied behaviours (83,1% of its variance was unique). This was not the case for the English country sample where *evaluation* loaded as part of the '(effortful) monitoring' factor. Some final differences between the countries can be seen when observing the behaviour of *use of model*. For the case of Chile, and as indicated by the sign of their loadings (see Table 5.9), a higher *use of model* went hand in hand with a lower *use of building strategies* within the factor extracted among Chileans. For the case of England, on the other hand, *use of model* formed a factor of its own. Consequently, this factor was labeled as 'orientation' for the English and as 'non-strategic orientation' for the Chilean students. 'Non-strategic orientation' was interpreted as students' lower tendency to brunch out to innovative/creative strategic ways of building, reducing activity to a cube-by-cube construction, as indicated by high *use of model* – or consultation of target model between every cube placement. There also was one particular self-regulatory process, 'strategic thinking', that showed how some strategic cognitive processes could be considered to be more central than others for self-regulation in different cultures. While this factor/process explained 16.67% of the variance of self-regulatory behaviours in Chile, it went as far as to explain 43.71% of it in England. Finally, another overall difference between samples related to the extent to which the studied self-regulatory behaviours could be considered to represent self-regulation. In England, the factors explained higher percentages of the variance of observed

behaviours than in Chile, around 40% and 30% average respectively. This suggests that, in general, the type of behaviour measured as indicative of self-regulation – as based on and inspired by the literature – could be considered more representative of this psychological function in English than in Chilean participants.

5.2.2.3. Summary

In summary, interesting similarities and differences between the Chilean and English students were found in terms of the self-regulatory processes (factors) represented by the self-regulatory behaviours measured. The self-regulation factors such as 'strategic thinking' (*planning before* and *using building strategies*) and '(effortful) monitoring' (*effort*, *monitoring*, and –in one sample – *evaluation*) seemed to be highly similar across the two country samples. The factors of 'effective monitoring-control' (Chile) and 'effective control' (England), shared similarities (both including *effective control of problems* and *learning from errors*), but also substantial differences. Specifically, while in Chile the factor included *awareness of errors*, a clear sign of effective metacognitive monitoring, in England it included *planning during (order)* (or the deployment of a building plan), which could be considered to reflect metacognitive control. This differentiation was also echoed in the fact that 'effective control' and 'effective monitoring' were found to be different self-regulation factors in England but not in Chile. Together these results indicate a higher differentiation of effective metacognitive monitoring and metacognitive control in the English sample than in the Chilean one.

There were other important differences between the country samples, the most noticeable of these being the uniqueness of the behaviour of *evaluation* within the Chilean sample. Such a result suggests that this behaviour could not be considered self-regulatory among the participating students from Chile. Also, differences in relation to *use of model* (i.e. frequency of consulting the goal model between building moves) was another interesting finding. Only in Chilean students did a higher *use of model* and lower *use of building strategies* load as part of the same factor; this subsequently labelled as 'non-strategic orientation'. Among English students, on the other hand, these two behaviours were part of two differentiated factors, 'orientation' and 'strategic thinking'. This particular finding suggests that while referring back to the task goal has only an orientation function among English students, it takes a non-strategic orientation function among Chilean students[30]. Finally, there was a clear difference in the extent to which the various self-regulatory behaviours observed were explained by the 'strategic thinking' factor across cultures. While these behaviours were explained to a large extent by 'strategic thinking' in English students' (43.71% of their variance), they were explained to a much lesser extent by this factor in Chilean students (16.67% of their variance). In general, self-regulation factors

[30] Note that 'non-strategic orientation' could also be argued to reflect lower levels of either abstract or creative thinking, as it reflects students tending to stick to the same type of cube-by-cube building strategy and not more complex varied ways of building, which would require higher levels of student imagination.

explained much more variance of self-regulatory behaviours in England (Avg. = 40.30%; range 24.8% to 66.45%) than in Chile (Avg. = 30.48%; range 16.67% to 49.89%).

In order to continue the enquiry into the equivalence of self-regulation across cultures, and given the clear differences in self-regulation factor structures, the pragmatic functionality of self-regulatory behaviours rather than self-regulation factors was analysed for each country sample guided by R.Q.3, which is presented in the next section.

5.2.3. RQ3. Do the same specific self-regulatory behaviours relate to levels of task achievement in both Chilean and English 8 to 9 year-old students? If not, which ones are most related to task achievement in each group?

Identifying the self-regulatory aspects that are most relevant for good achievement may provide an approximation to the self-regulatory processes considered as conducive to good results and, therefore, valued as productive in each cultural context. Regression estimations were considered to be an appropriate way of establishing the functionality self-regulatory behaviours had for performance across samples. Following the violation of the proportional odds assumption required to conduct ordinal logistic regressions, multinomial regressions were carried out instead. Multinomial regressions were considered to be a good fit for purpose because they allowed for working with ordinal outcome variables, as was the case of *final task accuracy* in this study. Moreover, multinomial regressions allowed for facilitating the detection of non-linear predictive effects (e.g. finding self-regulation to make a difference over mid- but not high levels of achievement) and the estimation of effects of each self-regulatory behaviour while controlling for other self-regulatory behaviours. This permitted carrying out a more fine-grain enquiry into the predictive functionality of each self-regulatory behaviour over task achievement across samples. Also, the Relative Risk Ratio (RRR) coefficient provided in these regressions can be interpreted as an effect size in itself, facilitating the differentiation between more and less relevant significant predictors. While negative effects are indicated by RRR ranging from 0 to 1, positive effects are indicated by values over 1. So values closer to 0 indicate a stronger negative relationship and large RRR values indicate strong positive relationships.[31] Estimation errors were clustered at the level of each student to account for the repeated

[31] When RRR is lower than 1, the percentage in which this likelihood is lowered should be determined looking at the difference between no found effects (i.e. RRR=1) and the estimated RRR. For example, if RRR= 0.75 then the variable of interest lowers in 25% (1-75=0.25) the chances of reaching the target outcome rather than the base/reference outcome. The opposite is calculated when RRRs are above 1 and therefore indicate a positive likelihood of reaching the target outcome rather than the reference/base outcome. For example, if RRR is 1.75 then the explanatory variable of interest enhances in 75% the chances of reaching the target outcome. Also if RRR is 2.5, then chances of reaching the target level do enhance in 150%.

measurement of the same self-regulatory behaviours across the 11 to 13 tasks carried out by each participating child. The predictive role of each self-regulatory behaviour for *final task accuracy* in each country sample is reported in the following subsections. A summary of results can be found in Table 5.12.

5.2.3.1. Self-regulatory behaviours predicting final task accuracy across country samples

Students were rated as completing the task with the final results being either: 'very different' from the goal pursued; similar to the goal but with 'many mistakes'; almost equal to the goal model incurring only a 'few mistakes'; or achieving a 'perfect result' building an identical figure to the goal model. All these levels of achievement were found with enough frequency across country samples, which allowed for appropriate estimations (25 cases being the lowest frequency for any given level). *Maintaining motivation* demonstrated some singularity issues when using it as a predictor within the Chilean and English samples. Therefore, this self-regulatory behaviour was excluded from the analyses reported here for each sample in order to obtain more accurate estimations.

5.2.3.1.1. Self-regulatory behaviours predicting final task accuracy in the Chilean sample

As can be seen from Table 5.10, among the self-regulatory behaviours found to enhance *final task accuracy* in Chilean participants were *planning during (order)*, *awareness of errors*, and *effective control of problems*. Moreover, the only self-regulatory behaviour found to have a negative effect over *final task accuracy* in these students was *asking for help*. In particular, awareness *of errors* was found to enhance the chances of Chilean students achieving a final figure with perfect results (RRR=65.90, error=76.57, Z=3.60, p = 0.000), or only a few mistakes (RRR=3.01, error=1.68, Z=1.98, p = 0.048) rather than a very different one from the target model. Furthermore, *effective control of problems* was found to have a positive predictive effect, making it more likely for Chilean students to achieve perfect results rather than very different results from the target model (RRR=6.51, error=5.00, Z=2.44, p=0.015). Finally, *planning during (order)* was demonstrated to enhance the likelihood of these students achieving a figure with only a few mistakes rather than a very different one from the target model (RRR=7.47, error=5.16, Z=2.91, p = 0.004). On the other hand, *asking for help* was found to have a negative predictive power lowering the likelihood of students reaching any higher *final task accuracy* than the lowest one possible. Specifically, when Chilean students engaged in *asking for help* they were less likely to achieve a model with many mistakes (RRR=0.12, error=0.12, Z=-2.03, p=0.043), only a few mistakes (RRR=0.07, error=0.08, Z=-2.35, p = 0.019), or perfect results

(RRR=0.03, error=0.44, Z=-2.94, p = 0.003), rather than a figure very different from the target model.

5.2.3.1.2. Self-regulatory behaviours predicting final task accuracy in the English sample

As can be seen from Table 5.11, the self-regulatory behaviours found to enhance the likelihood of English students achieving higher *final task accuracy* were *planning during (order)*, *monitoring*, *awareness of errors*, *evaluation*, and *effort*. Among those behaviours found to lower the likelihood of observing students reaching a higher level of *final task accuracy* than very low were *planning before*, *asking for help* and *concentration*.

For the case of the English sample, *planning during (order)*, *asking for help*, *concentration*, *effort*, and to certain degree *monitoring*, were found to consistently enhance the likelihood of students reaching a final result with only a few mistakes or even perfect results rather than one very different from the target model. Specifically, *planning during (order)* enhanced the chances of performing a final result with many mistakes (RRR=23.55, error=19.10, Z=3.89, p = 0.000), few mistakes (RRR=16.30, error=13.64, Z=3.34, p = 0.001), or perfect results (RRR=29.94, error=25.89, Z=3.93, p = 0.000) rather than a final result very different from the target model. The same tendency was found for *effort* which also enhanced the odds of achieving a figure with many mistakes (RRR=10.32, error=7.64, Z=3.15, p = 0.002), few mistakes (RRR=9.33, error=6.33, Z=3.29, p=0.001), or perfect results (RRR=9.64, error=7.48, Z=2.92, p = 0.004) rather than a figure very different from the target model. *Monitoring* was found to play a similar role in enhancing the chance of achieving a final result with many mistakes (RRR=5.70, error=2.67, Z=3.81, p = 0.000), few mistakes (RRR=12.52, error=9.50, Z=3.33, p=0.001), or perfect results – the latter one being of almost statistical significance (p=0.056)- (RRR=5.01, error=4.22, Z=1.91, p = 0.056) – rather than a very different figure from the target model.

Among the aspect that made a difference, but only over some levels of *final task accuracy*, were *awareness of errors* and *evaluation*. *Awareness of errors* enhanced the chances of arriving at a figure with only a few mistakes (RRR=11.08, error=9.25, Z=2.88, p=0.004), or perfect results (RRR=120.37, error=129.05, Z=4.47, p=0.000), rather than a very different one from the target model. *Evaluation* enhanced the chances of arriving at a figure with many mistakes rather than a very different one from the target model (RRR=3.01, error=1.54, Z=2.15, p=0.031).

Other aspects such as *asking for help* and *concentration* were found to have a consistent negative predictive effect on reaching a higher levels of achievement in English students. *Asking for help* lowered the chances of achieving a figure with many mistakes (RRR=0.02, error=0.02, Z=-3.19, p=0.001), few mistakes (RRR=0.03, error=0.03, Z=-3.61, p=0.000) or perfect results (RRR=0.04, error=0.04, Z=-3.47, p=0.001) rather than a very different figure form the target model. The case

of *concentration* was similar, with higher levels of *concentration* found to lower the chances of getting a higher level of *final task accuracy* than the lowest one. This was the case for achieving a figure with many mistakes (RRR=0.02, error=0.02, Z=-3.53, p=0.000), a few mistakes (RRR=0.01, error=0.02, Z=-3.38, p=0.001) or perfect results (RRR=0.01, error=0.02, Z=-2.72, p=0.007). Finally, *planning before* was found to lower the chances of achieving a figure with only a few mistakes (RRR=0.15, error=0.13, Z=-2.17, p=0.030) or a perfect figure (RRR=0.09, error=0.10, Z=-2.31, p=0.021) rather than a figure very different from the target model.

Table 5.10 Multinomial regression - Predictive role of self-regulatory behaviours on final task accuracy. Chile.

Level of final task accuracy	Self-regulatory behaviour	RRR	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
1. Very different from goal	Reference category/level						
2. Similar to goal, but with many mistakes	Planning before	1.90	1.18	1.03	0.302	0.56	6.39
	Planning during (order)	2.98	1.80	1.81	0.070	0.91	9.76
	Effective control of problems	1.53	0.60	1.09	0.275	0.71	3.30
	Learning from errors	1.49	0.82	0.73	0.465	0.51	4.37
	Use of building strategies	0.90	0.28	-0.36	0.722	0.49	1.64
	Use of model	1.26	0.46	0.64	0.522	0.62	2.57
	Monitoring	0.99	0.53	-0.01	0.990	0.35	2.82
	Awareness of errors	1.22	0.52	0.47	0.640	0.53	2.82
	Asking for clarifications	1.61	1.32	0.58	0.559	0.32	8.03
	Asking for help	0.12	0.12	-2.03	**0.043****	0.01	0.93
	Evaluation	1.42	0.32	1.53	0.125	0.91	2.22
	Effort	1.07	0.31	0.23	0.816	0.60	1.90
3. Almost equal to goal including only few mistakes	Planning before	2.40	1.82	1.15	0.248	0.54	10.58
	Planning during (order)	7.47	5.16	2.91	**0.004****	1.93	28.90
	Effective control of problems	3.28	2.02	1.93	0.054	0.98	10.99
	Learning from errors	2.39	2.00	1.04	0.299	0.46	12.37
	Use of building strategies	0.40	0.21	-1.74	0.082	0.14	1.12
	Use of model	1.42	0.79	0.62	0.535	0.47	4.24
	Monitoring	0.76	0.59	1.28	0.201	0.67	6.83
	Awareness of errors	3.01	1.68	1.98	**0.048****	1.01	8.96
	Asking for clarifications	1.64	1.36	0.60	0.547	0.33	8.29
	Asking for help	0.07	0.08	-2.35	**0.019****	0.01	0.65
	Evaluation	1.37	0.46	0.94	0.348	0.71	2.63
	Effort	1.38	0.63	0.71	0.480	0.56	3.39
4. Identical to goal	Planning before	1.69	1.35	0.66	0.508	0.36	8.05
	Planning during (order)	4.71	3.82	1.91	0.056	0.96	23.10
	Effective control of problems	6.51	5.00	2.44	**0.015****	1.44	29.34
	Learning from errors	2.76	3.90	0.72	0.472	0.17	44.02
	Use of building strategies	0.63	0.51	-0.57	0.569	0.13	3.11
	Use of model	0.68	0.48	-0.54	0.588	0.17	2.70
	Monitoring	1.20	1.15	0.20	0.842	0.19	7.77
	Awareness of errors	65.90	76.57	3.60	**0.000*****	6.76	642.66
	Asking for clarifications	0.45	0.44	-0.82	0.411	0.07	3.02
	Asking for help	0.03	0.03	-2.94	**0.003****	0.00	0.30
	Evaluation	1.21	0.50	0.46	0.643	0.54	2.70
	Effort	2.16	1.35	1.23	0.218	0.63	7.35

** / *** (In bold): Significant prediction at p<0.05** or p<0.001*** of the indicated 'self-regulatory behaviour' on *final task accuracy* at the predicted level.

Table 5.11 Multinomial regression - Predictive role of self-regulatory behaviours on final task accuracy. England.

Level of final task accuracy	Self-regulatory behaviour	RRR	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
1.Very different from goal	Reference category/level						
2. Similar to goal, but with many mistakes	Planning before	0.46	0.34	-1.06	0.290	0.11	1.95
	Planning during (order)	23.55	19.10	3.89	**0.000*** **	4.80	115.47
	Effective control of problems	0.43	0.21	-1.71	0.087	0.16	1.13
	Learning from errors	1.07	0.72	0.10	0.919	0.29	4.03
	Use of building strategies	0.55	0.38	-0.87	0.384	0.15	2.10
	Use of model	2.13	1.57	1.03	0.304	0.50	9.06
	Monitoring	5.79	2.67	3.81	**0.000*** **	2.35	14.31
	Awareness of errors	3.58	3.04	1.50	0.133	0.68	18.91
	Asking for help	0.02	0.02	-3.19	**0.001** **	0.00	0.21
	Evaluation	3.01	1.54	2.15	**0.031** **	1.10	8.23
	Concentration	0.02	0.02	-3.53	**0.000*** **	0.00	0.16
	Effort	10.32	7.64	3.15	**0.002** **	2.42	44.05
3. Almost equal to goal including only few mistakes	Planning before	0.15	0.13	-2.17	**0.030** **	0.03	0.83
	Planning during (order)	16.30	13.64	3.34	**0.001** **	3.16	84.01
	Effective control of problems	2.99	1.91	1.72	0.086	0.86	10.44
	Learning from errors	2.30	2.00	0.96	0.337	0.42	12.62
	Use of building strategies	0.57	0.55	-0.58	0.564	0.09	3.80
	Use of model	3.45	2.49	1.72	0.086	0.84	14.20
	Monitoring	12.52	9.50	3.33	**0.001** **	2.83	55.35
	Awareness of errors	11.08	9.25	2.88	**0.004** **	2.16	56.92
	Asking for help	0.03	0.03	-3.61	**0.000*** **	2.47	35.26
	Evaluation	1.42	0.62	0.80	0.422	0.60	3.34
	Concentration	0.01	0.02	-3.38	**0.001** **	0.00	0.16
	Effort	9.33	6.33	3.29	**0.001** **	2.47	35.26
4. Identical to goal	Planning before	0.09	0.10	-2.31	**0.021** **	0.01	0.70
	Planning during (order)	29.94	25.89	3.93	**0.000*** **	5.50	163.01
	Effective control of problems	1.16	1.15	0.15	0.883	0.16	8.14
	Learning from errors	6.67	6.63	1.91	0.056	0.95	46.78
	Use of building strategies	0.60	0.53	-0.57	0.565	0.11	3.41
	Use of model	1.44	1.09	0.48	0.634	0.32	6.39
	Monitoring	5.01	4.22	1.91	0.056	0.96	26.12
	Awareness of errors	120.37	129.05	4.47	**0.000*** **	14.72	984.28
	Asking for help	0.04	0.04	-3.47	**0.001** **	0.01	0.25
	Evaluation	2.22	1.08	1.63	0.102	0.85	5.77
	Concentration	0.01	0.02	-2.72	**0.007** **	0.00	0.29
	Effort	9.64	7.48	2.92	**0.004** **	2.11	44.14

** / *** (In bold): Significant prediction at p<0.05** or p<0.001*** of the indicated 'self-regulatory behaviour' on *final task accuracy* at the predicted level.

5.2.3.1.3. *Similarities and differences between Chilean and English samples in relation to the effects of self-regulatory behaviours on task achievement*

A summary of the self-regulatory behaviours found to be predictive of *final task accuracy* in each country sample can be found below in Table 5.12. As can be seen from this table, the self-regulatory behaviours found to be predictive of *final task accuracy* across country samples were *planning during (order)*, *awareness of errors*, and *asking for help*. The first two had an enhancing predictive effect, whereas the latter had a negative predictive effect in both samples. There were also some self-regulatory behaviours found to have null predictive effects over *final task accuracy* in both country samples. These behaviours were *learning from errors*, *use of building strategies* and *use of model*. Apart from these similarities, many other self-regulatory behaviours were found to be relevant for *final task accuracy* in England but not Chile. Among the self-regulatory behaviours found to have a unique positive effect in England were: *monitoring*, *effort*, and *evaluation*. On the other hand, among the self-regulatory behaviours found to have negative effects on *final task accuracy* in England were *concentration* and *planning before*. The only behaviour found to have a unique (positive) effect only for Chile was *effective control of problems*. It is also interesting to note that the effect of *effective control of problems* was accounted for by other self-regulatory behaviours in England but not in Chile (see initial significant predictive effects of *effective control of problems* on *final task accuracy* before the inclusion of other self-regulatory behaviours as predictors in Appendix 6.4).

Table 5.12 Summary of self-regulatory behaviours predicting final task accuracy in Chile and England

Self-regulatory behaviour	Chile		England	
	Direction of predictive effect on final task accuracy	Level of final task accuracy predicted relative to base level 'very different from target model'✣	Direction of predictive effect on final task accuracy	Level of final task accuracy predicted relative to base level 'very different from target model'✣
Planning during	Enhancing	3rd**	Enhancing	2nd***, 3rd** & 4th***
Awareness of errors	Enhancing	3rd** & 4th***	Enhancing	3rd** & 4th***
Asking for help	Lowering	2nd**, 3rd** & 4th**	Lowering	2nd**, 3rd*** & 4th**
Effective control of problems	Enhancing	4th**	-	-
Monitoring	-	-	Enhancing	2nd*** & 3rd**
Effort	-	-	Enhancing	2nd**, 3rd** & 4th**
Evaluation	-	-	Enhancing	2nd**
Concentration	-	-	Lowering	2nd***, 3rd** & 4th**
Planning before	-	-	Lowering	3rd** & 4th**
Learning from errors	-	-	-	-
Use of building strategies	-	-	-	-
Use of model	-	-	-	-

** Significant at p<0.05 level; *** Significant at p<0.001 level

✣The base level 1, indicates a level of accuracy very different from target model; 2nd level indicates similar to goal but with many mistakes; 3rd level indicates almost equal to goal but including a few mistakes and; 4th level indicates arriving to a figure that is identical to the target goal

Note: Direction of predictive effects indicates effect of increments in self-regulatory behaviour over chances of achieving higher final task accuracy than base level (very different from target model)

5.2.3.1.4. Cross cultural comparison of self-regulatory psychological functions predicting achievement

From the analysis above it is possible to suggest that the pragmatic functionality of specific self-regulatory behaviours might vary to important degrees according to culture. Evidencing this conclusion was the high number of self-regulatory behaviours predicting achievement (*final task accuracy*) in one country sample but not the other. If we considered the different psychological processes these self-regulatory behaviours were found to have, as suggested by the previously reported factor analyses, it might be possible to go one step further and suggest the self-regulatory processes that are most likely to underlie achievement across cultures (although only by proxy). Results from this exercise are presented in Table 5.13.

Table 5.13 Relevant self-regulatory behaviours, associated self-regulation factors, and their relation to final task accuracy across county samples

Chile		Self-regulatory behaviour	England	
Self-regulation process/factor represented ✪	Effect over final task accuracy		Effect over final task accuracy	Self-regulation process/factor represented ✪
Organisation	↑	**Planning during**	↑↑↑	Effective control
Effective monitoring-control	↑↑	**Awareness of errors**	↑↑	Effective monitoring
Unfactored behaviour	↓↓↓	**Asking for help**	↓↓↓	Unfactored behaviour
Effective monitoring-control	↑	**Effective control of problems**		
		Monitoring	↑↑	(Effortful) monitoring
		Effort	↑↑↑	(Effortful) monitoring
		Evaluation	↑	(Effortful) monitoring
		Concentration	↓↓↓	Unfactored behaviour
		Planning before	↓↓	Strategic thinking

↑↓ Each arrow indicates a statistically significant effect ($p<0.005$ or $p<0.001$) of each self-regulatory behaviour on final task accuracy. Each self-regulatory behaviour could have enhanced/lowered the chances of arriving to higher than base levels of *final task accuracy* in up to three different degrees. Therefore, the number of arrows represents the number of degrees (or contrasts between upper and base levels of accuracy) predicted by each self-regulatory behaviour within each sample and regression. The direction of the arrows represents whether the nature of the relationship was positive or negative.

✪ Colour indicates the type of self-regulation function represented by each behaviour within each sample.

In general, Table 5.13 shows that English students were more likely to achieve higher levels of task achievement (*final task accuracy*) when activating either higher levels of 'effective control', '(effortful) monitoring', or 'effective monitoring' self-regulation processes. On the other hand, Chilean students were more likely to achieve higher levels of task achievement when activating either higher levels of 'effective monitoring-control' or 'organisation' self-regulation processes.

Therefore, effective monitoring and control could be said to predict higher performance in both country samples. On the other hand, two self-regulation processes enhancing performance differed across country samples. Specifically, while '(effortful) monitoring' made a positive difference in England, 'organisation' made a positive difference in Chile.

Some other self-regulatory psychological processes were found to have negative predictive effects on task achievement across samples. English students were more likely to demonstrate lower levels of task achievement when they engaged in 'strategic thinking' processes or behaved showing higher *concentration* or *asking for help*. Lower levels of performance were also more likely to be achieved by Chilean students when they engaged in more *asking for help*.[32] The relationships reported here between self-regulatory processes and task achievement, however, are only established by proxy with respect to the self-regulatory behaviours representing them.[33]

5.2.3.2. Summary

Many more self-regulatory behaviours, however, were found to have culture-specific effects. The large majority of these were effects found for English participants but not Chileans. Among the self-regulatory behaviours positively predicting higher *final task accuracy* in English participants were *monitoring*, *evaluation,* and *effort*. Among those negatively predicting *final task accuracy* in these students were *planning before* and *concentration*. On the other hand, the only self-regulatory behaviour found to have a positive culture-specific effect on *final task accuracy* among Chilean students was *effective control of problems.* No negative culture-specific effects over *final task accuracy* were found among Chileans.

Additionally, the inferred relationships between psychological processes (represented by the explored behaviours over higher levels of achievement) were both similar and different across samples. 'Effective monitoring' and 'effective control' (or their 'effective monitoring-control' combination) were inferred predictors of higher achievement across country samples. On the other hand, among the country differences were the pragmatic importance of '(effortful) monitoring' and 'organisation'. In particular, while activating '(effortful) monitoring' had an inferred positive predictive effect on task achievement in England, it had no inferred effects in Chile. Conversely, the function of 'organisation' (i.e. following an orderly plan) had positive inferred effects in Chile but none in England. Finally, the function of 'strategic thinking'

[32] *Concentration* and *asking for help* were found to have high levels of curtosis and skewness in the Chilean and English sample, incompatible with the EFA extraction method applied. Therefore, their self-regulatory psychological function (factor/process) could not be determined.

[33] As indicated in Section 5.2.2.3, predictions of factor scores over *final task accuracy* or other outcomes were not carried out as part of this thesis due to the large cultural differences in the self-regulation factor solutions presented in RQ2. Such differences would have made it impossible to conclude with confidence about any cross-cultural similarity or difference regarding the effect of particular factors (self-regulation processes) extracted.

(represented by *planning before*) had inferred negative effects over achievement in England but not in Chile.

5.3. Conclusions

The aim of this chapter was to explore whether or not self-regulation behavioural strategies developed to fulfil *culturally adaptive functionalities*. In order to reach this aim, Chilean and English 8 to 9 year-old students were compared with regards to the extent to which they engaged in specific self-regulatory behaviours, and the self-regulatory and pragmatic functions of these behaviours were compared across cultures. From these enquiries, it was possible to reach a variety of conclusions, all of which converge in suggesting that levels and functions of self-regulatory behaviours vary according to culture to a great extent. The specific conclusions reached for each research question are explicated as follows.

5.3.1. Research question 1 conclusion

The results provide some preliminary evidence supporting the relevance of cultural context for levels of self-regulation in children. They indicate that the levels of key self-regulatory behaviours indicating effective metacognitive monitoring and metacognitive control varied across country samples. Specifically, English students showed higher levels of *awareness of errors* and *effective control of problems* than Chilean students. Chileans were also found to depend more on adults (the researcher), as indicated by their higher engagement of *asking for help* to solve difficulties. Chilean students also showed signs of being relatively more overconfident than their English counterparts (achieving lower task accuracy while showing lower signs of struggle). This indicates

At this point it is important to bear in mind that parents from the English sample were more educated than those from the Chilean one (see detail of parents' education in Table 3.1). Therefore, results may be reflecting differences in the cultural capital of the English and Chilean participants. Participating schools were, however, sampled in both countries matching them in terms of their relative socio-economic position within their own countries (i.e. according to their within-country percentile of student vulnerability and free school meals) (Section **3.3.3**). Consequently, results may be still possible to consider as indicating differences likely to be found between students from the two countries considering the current levels of education of their populations.

5.3.2. Research question 2 conclusion

Results allow for the suggestion that there were important cultural similarities and differences in terms of the self-regulatory processes that specific self-regulatory behaviours represented (or implemented) across country samples. There were also important similarities and differences regarding the nature or quality of the self-regulatory processes in which students engaged when carrying out a task. Among the most important cross-cultural similarities and differences were:

- *Evaluation* – a widely accepted procedural phase of self-regulation – was found to be part of self-regulation processes in England but not in Chile.
- *Use of model* (orienting oneself) was found to be linked to lower 'strategic thinking' in Chile but not in England.
- The self-regulation factor of 'effective monitoring' and 'effective control' were found to be more differentiated in England than in Chile (where they loaded into same factor).
- 'Strategic thinking' was found to be much more central to self-regulatory behaviours (explaining much more of their multiple variance) in England than in Chile.
- 'Strategic thinking' (thinking about alternative ways to do something) and '(effortful) monitoring' (pausing to think about activity progress or problems) were found to be similar processes (including similar behaviours) across cultures.

5.3.3. Research question 3 conclusion

In general, the results show that while a few self-regulatory behaviours related to achievement in similar ways across country samples, most of them did not. The cross-country differences, nonetheless, came from culture-specific functionalities of self-regulatory behaviours rather than opposite (enhancing v. lowering) functionalities of these behaviours over task achievement across cultures. The predominant culture-specificity of the results suggest that it is possible that students' self-regulatory behaviours gain their pragmatic functionality from culture. Among the key findings were:

- *Monitoring*, *evaluation,* and *effort* had a culture-specific positive pragmatic function over *final task accuracy* in England.
- *Planning before* and *concentration* had a culture-specific negative pragmatic function over *final task accuracy* in England.

- *Effective control of problems* had a culture-specific positive functionality over final task accuracy in Chile. Its predictive effect was accounted for by other self-regulatory behaviours in England.
- *Awareness of errors* and *planning during (order)* behaviours consistently predicted higher *final task accuracy* in both country samples.
- *Asking for help* predicted lower *final task accuracy* across samples (possibly due to the researcher not providing the help required).

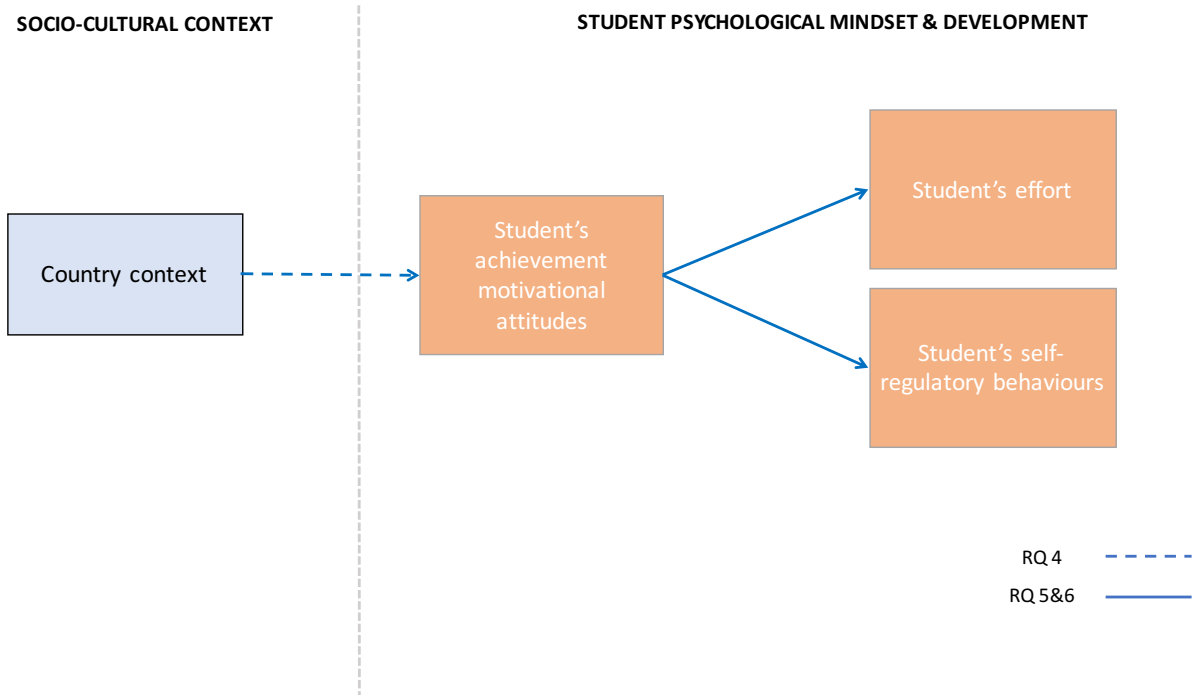
A similar conclusion can be reached, by proxy, in relation to the importance of culture for the pragmatic functionality of self-regulation factors or processes. The way in which these processes could be connected to positive or negative effects over task achievement, through the measured self-regulatory behaviours representing them, was culture-specific to an important degree. Notwithstanding, the associations also indicate, by proxy, the universality of the positive functionality of effective metacognitive monitoring and control processes, both usually understood as the core cognitive mechanisms of self-regulation (Section 2.1)

Together, the results of this chapter suggest that self-regulation develops in ways that are culture-specific in terms of: the levels of effective self-regulation; the way in which specific self-regulatory behaviours represent the psychological processes that comprise self-regulation; the type of psychological processes constituting self-regulation; and the pragmatic functionality for task achievement of behaviours through which students implement self-regulation. All this suggests that self-regulation might develop through behavioural strategies to fulfil *culturally adaptive functionalities*. Given the large differences in education cultures across England and Chile, one could venture to say that it is possible that such cultural functionality may be shaped by each country's culture of education. This could either be because children internalize functions learned from their education context or, alternatively, because they develop functions that allow them to navigate the social affordances (demands) of their education context. This theorization, however, reminds an inference so far. The extent to which education cultures explain the extent in which students engage in specific self-regulatory behaviours will be explored in Chapter 7. Before engaging in such an exploration, however, Chapter 6 explores the way culture might be relevant for the adoption of motivational attitudes underlying self-regulation, as well as the function that these attitudes have for driving effort and other cognitively based self-regulatory behaviours.

6. Findings II. The role of culture in motivational attitudes, and their function in effort and self-regulation

The previous chapter addressed the role of education culture in the development of children's self-regulatory behaviours. Results reported previously suggested that culture could indeed have an important role in students' self-regulation. Self-regulatory behaviours were found to represent different psychological factors and have different pragmatic functionalities according to culture. The results of these enquiries were interpreted as providing relevant preliminary evidence regarding the *culturally adaptive functionality* of self-regulation. These results, however, did not provide much insight into whether motivational aspects known to underlie self-regulation, such as achievement goal orientations, could also be considered to be adopted and function in ways that are adaptive to culture. This chapter attempts to provide some preliminary answers on this matter. A general overview of the different types of variables involved in this chapter and the relationships explored can be seen in Figure 6.1.

Figure 6.1 Summary of relationships explored between country culture, motivational attitudes, and self-regulation



As can be seen from Figure 6.1 above, the chapter explores the role that culture may have in the adoption of achievement motivational attitudes, and the functionality of these attitudes for self-regulation and for effort required for self-regulation. This type of enquiry is of particular relevance if we consider the person-in-context paradigm subscribed by socio-cognitive

perspectives containing achievement goal orientation theory. In this paradigm, motivational orientations (or attitudes) have been suggested to have a social origin in what is valued and functional within a social system (Darnon, Dompnier, Delmas, Pulfrey, and Butera, 2009; Darnon, Dompnier, and Poortvliet, 2012). The exploration reported in this chapter could, therefore, be considered to contribute to understanding how, if at all, students' achievement motivational attitudes might gain different functionality among students educated within social systems promoting different cultural values. This would allow for continuing exploration of the fit of a theory suggesting the *culturally adaptive functionality* of self-regulation by studying the cultural functionality of the motivational attitudes underlying self-regulation.

The research questions that guide the enquiries within this chapter are:

R.Q.4 *Are there any differences between Chilean and English 8 to 9 year-old students in the achievement motivational attitudes they tend to adopt? If yes, how do they differ?*

R.Q.5 *Does the way that achievement motivational attitudes predict effort in Chilean and English 8 to 9 year-olds differ? If yes, how?*

R.Q.6 *How and to what extent does the motivational role that achievement motivational attitudes have for self-regulatory behaviours vary between Chilean and English 8 to 9 year-old students?*

While R.Q.4 explores differences in the extent to which students from Chile and England expressed adoption of different achievement motivational attitudes (considered to represent students' goal orientations), R.Q.5 and R.Q.6 explore the pragmatic/productive functionality that achievement motivational attitudes had for student effort and self-regulation across country samples.

In order to carry out these enquiries, as previously explained (Section 3.4.2.2), data from students' interviews was analysed. Achievement motivational attitudes such as 'orientations' (attitudes towards effortful and performance behaviours), 'achievement motives' (reasons driving such orientations), as well as 'goal oriented motives' (specific orientation-motive combinations) were researched using interview data. Among the attitudinal 'orientations' explored were *effortful learning approach*, *effortful learning avoidance*, *performance approach* and *performance avoidance*. The 'achievement motives' considered were six, namely *learning*, *helping others to learn*, *performing high(er)*, *feeling able*, *avoiding feeling unable*, and *relating to others*. Orientation-motive combinations (referred to here as 'goal oriented motives') consisted of the 24 different possible combinations between these four attitudinal 'orientations' and six 'achievement motives'.

The chapter is divided in three sections. A first section presents a brief preliminary analysis of the descriptives of students' achievement motivational attitudes. A second section presents the results of the three different research questions, addressing each of them in turn. For each

research question summaries are offered. Finally, a third concluding section reminds the reader of the main findings of the chapter and the way in which these relate to a theory regarding the *culturally adaptive functionality* of motivational attitudes underlying self-regulation.

6.1. Descriptives of achievement motivational attitudes

In this section, first some descriptive information is presented of the different attitudinal 'orientations', 'achievement motives' and 'goal oriented motives' (i.e. orientation-motive combinations) by country and classroom. The data reported for students represents the frequency with which they expressed in their interviews different ideas inferred to reflect achievement motivational attitudes. The objective of this descriptive analysis was to check for any potential characteristics of the data that may help/obstruct further statistical contrast and estimations. Therefore, tables with full information are presented, but only commented towards the end of the section at a general level and with respect to anomalies found regarding the presence and variability of achievement motivational attitudes across the explored country and classroom samples of students.

For the different achievement motivational attitudes, means, standard deviations and number of students expressing them are reported. Means and standard deviation values were calculated considering the *total number of distinctive ideas*[34] (hereafter simply referred as 'ideas') expressed by all students in each sample. On the other hand, number of students reflects presence or the number of participants expressing the indicated achievement motivational attitude *at least once* in each sample.

[34] Distinctive ideas exclude instances in which students might have repeated a particular idea during their interview. Therefore, the frequency (or variety) of these ideas can be interpreted as indicating the salience of the achievement motivational attitude they represent across achievement contexts among the children sampled.

6.1.1. Attitudinal 'orientations' descriptives

Table 6.1 shows the mean, standard deviations and presence across participants of attitudinal 'orientations' per country sample.

Table 6.1 Descriptives - attitudinal 'orientations' in Chilean and English participants

Attitudinal orientations	Chile			England		
	Mean	Std. Dev.	N students (out of 24)	Mean	Std. Dev.	N students (out of 24)
Effortful learning approach	3.87	1.54	24	4.92	1.77	24
Effortful learning avoidance	1.13	1.19	15	1.00	1.06	14
Performance approach	4.04	1.85	24	4.50	1.67	24
Performance avoidance	4.17	2.65	24	3.37	1.53	24

Note: All values have been calculated in relation to the 24 students interviewed per country.

6.1.2. 'Achievement motives' descriptives

Table 6.2 shows the mean, standard deviations and presence across participants for 'achievement motives' per country sample.

Table 6.2 Descriptives - 'achievement motives' in Chilean and English participants

Achievement motive	Chile			England		
	Mean	Std. Dev.	N students (out of 24)	Mean	Std. Dev.	N students (out of 24)
Learning	3.04	2.10	23	3.46	1.47	23
Helping others to learn	0.54	0.59	12	0.46	0.78	8
Performing high(er)	1.75	1.60	19	1.54	1.87	16
Feeling able	0.46	0.88	7	0.58	1.10	9
Avoiding feeling unable	1.08	1.25	14	1.71	1.33	20
Relate	2.33	1.58	22	2.08	1.32	20

Note: All values have been calculated in relation to the 24 interviewed students per country.

6.1.3. 'Goal oriented motives' descriptives

Table 6.3 shows the mean, standard deviations and presence across participants for 'goal oriented motives' per country sample.

Table 6.3 Descriptives - Goal orientated motives expressed by Chilean and English participants

Goal oriented motive		Chile			England			Both countries
		Mean	Std. Dev.	N	Mean	Std. Dev.	N	Range of N of responses per student
Effortful learning approach	Learning	2.12	1.33	22	2.71	1.43	23	0-5
	Helping others to learn	-	-	0	0.13	0.45	2	0-2
	Performing high(er)	0.50	0.59	11	0.17	0.38	4	0-1
	Feeling able	0.08	0.41	1	0.25	0.68	4	0-3
	Avoiding feeling unable	-	-	0	0.13	0.34	3	0-1
	Relate	-	-	0	0.08	0.28	2	0-1
Effortful learning avoidance	Learning	-	-	0	0.04	0.20	1	0-1
	Helping others to learn	-	-	0	-	-	0	-
	Performing high(er)	0.04	0.20	1	0.08	0.41	1	0-2
	Feeling able	-	-	0	-	-	0	-
	Avoiding feeling unable	0.33	0.48	8	0.42	0.65	8	0-2
	Relate	-	-	0	-	-	0	-
Performance approach	Learning	0.54	0.78	9	0.63	0.92	9	0-3
	Helping others to learn	0.54	0.59	12	0.29	0.55	6	0-3
	Performing high(er)	1.00	1.14	15	0.83	1.24	11	0-2
	Feeling able	0.21	0.42	5	0.33	0.57	7	0-5
	Avoiding feeling unable	0.04	0.20	1	0.04	0.20	1	0-2
	Relate	0.92	0.88	16	1.21	1.14	16	0-3
Performance avoidance	Learning	0.38	0.58	8	0.08	0.41	1	0-2
	Helping others to learn	-	-	0	0.04	0.20	1	0-1
	Performing high(er)	0.21	0.42	5	0.46	0.66	9	0-2
	Feeling able	0.17	0.48	3	-	-	0	0-2
	Avoiding feeling unable	0.71	0.96	10	1.13	0.90	18	0-3
	Relate	1.42	1.28	19	0.79	0.93	13	0-5

Note: All values have been calculated in relation to the 24 students interviewed per country sample.
Shading shows goal oriented motives found in at least 5 students in any of the two countries.

6.1.4. General characteristics and anomalies in the data[35]

In general, in relation to students' attitudinal 'orientations' and 'achievement motives' it is possible to say that both showed appropriate levels of presence and variability across all country samples. Specifically, achievement motivational attitudes had good levels of presence across countries, with the most infrequent attitudinal 'orientation' being *effortful learning avoidance* (14 students in England) and the most infrequent 'achievement motive' being *feeling able* (7 students in Chile). Standard deviations ranged from 1.06 to 2.65 ideas representing attitudinal 'orientations', and 0.59 to 2.10 ideas representing 'achievement motives' on average in each country sample.

The case of 'goal oriented motives' was different. Several of these orientation-motive combinations showed extremely low or null presence in one of the country samples. There were many 'goal oriented motives' with 3 or less students expressing them per country sample. These were considered as non-relevant 'goal oriented motives' due to their infrequency (e.g. *effortful learning approach driven by* either *avoiding feeling unable* or *relating to others*). Those 'goal oriented motives' found to be expressed for a slightly higher number than 3 students were *performance approach driven by feeling able* (5 students in Chile and 7 in England) and *performance avoidance motivated by learning* (8 students in Chile and 1 in England). This gap in the number of students expressing certain 'goal oriented motive' was used as a differential to decide which 'goal oriented motives' could be considered relevant for further analysis and which could not. As a consequence, only those attitudes expressed by 5 or more students in any of the 2 country samples were considered for further country level analysis (see shaded 'goal oriented motives' previously shown in Table 6.3).

Additionally, all those 'goal oriented motives' considered to have appropriate presence, also demonstrated adequate variability at country level. Standard deviations for these aspects, ranged from 0.41 to 1.43 ideas expressed across students per country. Table 6.4 shows the different 'goal oriented motives' and indicates those that were considered as appropriate for further analysis at country level.

[35] Due to the use of raw frequencies of answers and not scales, it is not possible to discuss floor or ceiling effects here. Only presence and dispersions of the achievement motivational attitudes researched are addressed.

Table 6.4 Suitability of 'goal oriented motives' for further analyses at country level

Goal orientated motive		Suitable level of presence for country level analysis	Suitable level of variability for country level analysis*
Effortful learning approach	**Learning**	**OK**	**OK**
	Helping others to learn		
	Performing high(er)	**OK**	**OK**
	Feeling able		
	Avoiding feeling unable		
	Relate		
Effortful learning avoidance	Learning		
	Helping others to learn		
	Performing high(er)		
	Feeling able		
	Avoiding feeling unable	**OK**	**OK**
	Relate		
Performance approach	**Learning**	**OK**	**OK**
	Helping others to learn	**OK**	**OK**
	Performing high(er)	**OK**	**OK**
	Feeling able	**OK**	**OK**
	Avoiding feeling unable		
	Relate	**OK**	**OK**
Performance avoidance	**Learning**	**OK**	**OK**
	Helping others to learn		
	Performing high(er)	**OK**	**OK**
	Feeling able		
	Avoiding feeling unable	**OK**	**OK**
	Relate	**OK**	**OK**

*Suitable levels of variability are only indicated for those goal oriented motives for which level of presence were found to be suitable.

From the summary in Table 6.4, it is possible to observe that only 12 out of 24 'goal oriented motives' were found to be suitable for further analysis. Most of those referring to either *performance approach* or *performance avoidance* were found to acceptable levels across students. 'Goal oriented motives' referring *to effortful learning approach* and *effortful learning avoidance* were found less, with only three of these attitudes being worth further exploration.

6.2. Results

In this section, findings of the enquiries carried out to answer each research question are presented. In the subsections addressing each of these questions in turn, the reader will first find a description of the statistical procedures followed to answer each research question. Then, results are reported per country sample and summarized together for both samples. To aid the reader with the complexity of this chapter, tables summarizing and comparing country results for R.Q.4 (Table 6.5 to Table 6.7), R.Q.5 (Table 6.13), and R.Q.6 (Table 6.28) can be found throughout the chapter. Conclusions with respect to each guiding research question are offered towards the end of the chapter.

6.2.1. RQ4. Are there any differences between Chilean and English 8 to 9 year-old students in the achievement motivational attitudes (goal orientations) they tend to adopt? If yes, how do they differ?

This research question explored differences between country samples in relation to the adoption of particular attitudinal 'orientations', 'achievement motives' and 'goal oriented motives'. As mentioned above, adoption was here operationalized as the frequency with which students expressed ideas indicative of specific achievement motivational attitudes. Following the non-normal distributions in the wide majority of these measures (Appendix 5, section 5.1.1), differences between countries were studied by applying a series of non-parametric Mann-Whitney U tests. The respective analyses of attitudinal 'orientations', 'achievement motives', and 'goal oriented motives' are presented in separate subsections. Overall, results showed that various achievement motivational attitudes were adopted to different degrees by students from each country sample. These results are presented in more detail as follows.

6.2.1.1. Differences in attitudinal 'orientations' across country samples

As Table 6.5 shows, it was possible to find differences between country samples only in the attitude students had towards *effortful learning approach* (U=192.00, Z=-2.013, p=0.044). Specifically, English students showed a stronger positive attitude ($\bar{x}$=4.92) than Chilean students ($\bar{x}$=3.87) towards *effortful learning approach*. Other attitudinal orientations, such as *performance approach* (U=246.00, Z=-0.882, p=0.378), *performance avoidance* (U=251.50, Z=-0.765, p=0.444), and *effortful learning avoidance* (U=274.50, z=-0.293, p=0.770) did not differ to a level of statistical significance between the samples.

Table 6.5 Mann-Whitney U test – Differences in attitudinal 'orientations' between Chilean and English participants.

Goal orientation	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Effortful learning approach	192.00	-2.013	**0.044****
Performance approach	246.00	-0.882	0.378
Effortful learning avoidance	274.50	-0.293	0.770
Performance avoidance	251.50	-0.765	0.444

**Statistically significant difference p<0.05

*Tendency to statistical difference p<0.10

6.2.1.2. Differences in 'achievement motives' across country samples

Overall, in terms of 'achievement motives' the results of the test conducted showed that the two samples did not differ (see Table 6.6).

Table 6.6 Mann-Whitney U test – Differences in 'achievement motives' between Chilean and English participants

Achievement motive	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Learning	235.500	-1.10	0.273
Helping others to learn	248.500	-0.94	0.349
Performing high(er)	249.000	-0.83	0.405
Feeling able	266.000	-0.55	0.585
Avoiding feeling unable	204.500	-1.79	0.07
Relate	277.500	-0.22	0.825

**Statistically significant difference p<0.05

6.2.1.3. Differences in 'goal oriented motives' across country samples

As can be seen from Table 6.7, results from the Mann-Whitney U test showed that numerous 'goal oriented motives' differed or tended to differ to a level of statistical significance between samples. The vast majority of these 'goal oriented motives' were found to be significantly higher in Chile than in England.

Among the 'goal oriented motives' found to be statistically higher for Chileans were *effortful learning approach motivated by performing high(er)* (U=202.00, z=-2.20, p=0.028; Chile $\bar{x}$ =0.50 and England $\bar{x}$ =0.17), and *performance avoidance driven by learning* (U=207.50, z=-2.45, p=0.014; Chile $\bar{x}$ = 0.38 and England $\bar{x}$ = 0.08). Other aspects only tended towards statistical difference.

Table 6.7 Mann-Whitney U test - Differences in 'goal oriented motives' between Chilean and English participants (prevalent 'goal oriented motives' only)

Goal oriented motive		Mann-Whitney U	Z	Asymp. Sig. (2-tailed)	Sample found to be higher
Effortful learning approach	Learning	220.50	-1.43	0.154	-
	Performing high(er)	202.00	-2.20	**0.028****	Chilean
Effortful learning avoidance	Avoiding feeling unable	280.00	-0.20	0.841	-
Performance approach	Learning	281.50	-0.16	0.877	-
	Helping others to learn	219.00	-1.68	0.093*	Chilean
	Performing high(er)	250.00	-0.84	0.400	-
	Feeling able	261.50	-0.73	0.468	-
	Relate	254.00	-0.74	0.457	-
Performance avoidance	Learning	207.50	-2.45	**0.014****	Chilean
	Performing high(er)	235.00	-1.38	0.168	-
	Avoiding feeling unable	208.50	-1.74	0.082*	English
	Relate	200.00	-1.93	0.054*	Chilean

Note: Values have been assigning mean rank to all ties.

** Statistically significant differences $p<0.05$;

* Tendency to statistical difference $p<0.10$

6.2.1.4. Summary

Overall, it is possible to say that, relative to Chilean participants, English students had a more positive orientation towards *effort* and embraced the same achievement motives to a similar extent. In terms of orientation-motive combinations, results suggest that some specific 'goal oriented motives' were more prevalent in Chilean than in English participants. Specifically, results indicate that an interest in performing highly drove a positive attitude towards effort (*effortful learning approach driven by performing high(er)*) in Chile more than England. They also show that an interest in learning drove a negative attitude towards demonstrating performance (*performance avoidance driven by learning*) in Chileans more than in the English students.

6.2.2. RQ5. Does the way that achievement motivational attitudes predict effort in Chilean and English 8 to 9 year-olds differ? If yes, how?

Through this research question the function of motivational attitudes in relation to *effort* representing persistence were explored. Regressions were carried out to explore these functionalities. The strength with which students were thought to adopt different achievement motivational attitudes, as determined from the frequency of their expression in their interviews, was used as a predictive variable. The levels of *effort* predicted in these regressions

corresponded to the persistence observed and measured in the 11 to 13 different cube assembly tasks each student carried out for the study. A data base was formed of approximately 300 entries for each country sample. This was conformed of 11 to 13 scores per student connected to the number of times students expressed achievement motivational attitudes in their interview[36].

Multinomial logistic regressions were applied due to the ordinal nature of explained variables and the non-normal distribution of many of both explanatory and explained variables – which made inadequate the use of regressions offering more simple interpretations, such as ordinal regression – (see Appendix 5.1 for normality checks). Multinomial logistic regressions were particularly beneficial within this analysis as they allowed for exploration of any differential (non-linear) effects of motivation over the different levels of *effort* (e.g. low, middle, and high). Being able to detect these non-linear effects was beneficial in the research of motivational attitudes, because students' motivational orientations for learning have been found to have differential effects over high and mid-levels of effort (Capa, Audiffren, & Ragot, 2008).

The control and output variables selected to explore the functionality of achievement motivational attitudes followed findings from previous research. Previous studies have indicated the important predictive effects of motivational attitudes (Chouinard, Karsenti, and Roy, 2007; Phan, 2009) and parental education (Gonzalez-DeHass et al., 2005; PIRLS, 2014)[37] on students' effort. Therefore, motivational attitudes and parental education were entered as predicting and control variables in all multinomial regressions conducted and reported. Controlling for parental education allowed for arrival at a more precise estimation of the functionality of the motivational attitudes under analysis, and consequently, through the comparisons of its effects in different cultural contexts, at a more accurate picture of their *cultural adaptive functionality*.

The predictive effects of only some types of achievement motivational attitudes, the most explanatory, are reported on here. As could be seen from the way in which motivational attitudes were expressed by students and measured (Section 4.1.2.2.1.3), 'achievement motives' represent the reasons students gave for their expressed 'orientation'. Their co-occurrences were operationalized in the form of 'goal oriented motives' (or orientation-motive combinations). To avoid repetition of explanatory information only one, the most explanatory, of these combinations of achievement motivational attitudes representing students' interview answers was selected. In order to select the combination, the two models were compared in terms of the extent to which they seemed to explain the variance of *effort*. The first model was composed of both 'orientations' and 'achievement motives' as predictors in tandem, while the second model

[36] The number of students from the English sample reduced from 25 to 24 students. One interview was not included due to time constrains.

[37] Parental education has been found to be closely related to parental involvement (PIRLS, 2014), which in turn has been found to explain motivation for learning to relevant degrees (Gonzalez-DeHass et al., 2005).

included as predictors the 12 'goal oriented motives' previously identified as relevant (Section 6.1.3). Both models were controlled for parental education. Finally, in order to account for the 11 to 13 tasks carried out by the same student, estimation errors were clustered at the level of each student in all models and multinomial regressions reported. The explorations of the models analysed to select the most explanatory achievement motivational attitudes for *effort* are presented first.

6.2.2.1. Selecting the most explanatory achievement motivational attitudes

The extent to which the different types of achievement motivational attitudes explained the variance of *effort* observed in participating students was estimated through McFadden's pseudo R square, a similar measure to the conventional R square, but especially designed for logistic regressions (Hosmer, Lemeshow, & Sturdivant, 2013). Similar to R square, this particular measure ranges from 0 to 1, where 1 indicates total explanation of the predicted outcome variable, and 0 a null explanation. Table 6.8 shows the explanatory models compared and their corresponding pseudo R squares.

Table 6.8 Proportion of variance (pseudo R squares) of Effort explained by 'Orientations' and 'Achievement motives' v. 'Goal oriented motives'; Chile and England

Explained variable:	Effort	
Explanatory model	Chile	England
1. Orientations + Achievement motives	0.097	0.082
2. Goal oriented motives	**0.114**	**0.098**

In bold: pseudo R square of model explaining the most variance

From Table 6.8, above, it is possible to conclude that the achievement motivational attitudes explaining the variance of *effort* to higher degrees were 'goal oriented motives' (orientation-motive combinations). As a consequence, in the sections to come, the function of 'goal oriented motives' is reported for students' *effort* within each country context.

Given the large amount of 'goal oriented motives' and data driven nature, to aid the interpretation of the results, a table (see Table 6.9) with equivalences between these and other closely related motivational constructs is provided. Specifically, this table included goal orientations, social orientations and other closely related motivational constructs that each goal oriented motive could be argued to represent or to be closely related to.

Table 6.9 Equivalences between goal oriented motives expressed by students and motivational constructs found within the literature

Goal oriented motive	Related motivation construct
Effort approach driven by learning	Mastery approach
Effort approach driven by performing high(er)	Performance approach
Performance approach driven by performing high(er)	Performance approach
Performance approach driven by feeling able	Performance approach
Performance avoidance driven by performing high(er)	Performance avoidance
Performance avoidance driven by avoiding feeling unable	Performance avoidance
Performance avoidance driven by learning	Mix of mastery approach and performance avoidance
Performance approach driven by learning	Mix of mastery and performance orientation
Effort avoidance driven by avoiding feeling unable	Fear of failure (mastery and performance avoidance)
Performance approach driven by relating to others	Mix of performance orientation and relatedness / Social affiliation goal
Performance avoidance driven by relating to others	Relatedness / Social affiliation goal
Performance approach driven by helping others to learn	Collaborative attitude

6.2.2.2. 'Goal oriented motives' predicting effort across country samples

Within this section the predicting power of 'goal oriented motives' over *effort* is reported. As the reader might remember, measures of *effort* reflected the level of persistence students invested when encountering challenges in any of these tasks (Section 4.1.1.1.5). Three levels of *effort* investment were considered as possible outcomes: high, middle and low *effort* intensity/frequency. Low *effort* was considered as the level of reference, or base level, in all computed multinomial regressions. Therefore, every multinomial regression provides information about how each 'goal oriented motive' predicted the likelihood of observing students investing a higher level of *effort* relative to the baseline of low *effort* when facing challenges. Results are reported for the case of Chileans before moving to report the results for English participants. A summary table (Table 6.13) containing the most important predictive effects over *effort* reported in the subsequent sections for both Chile and England can be found in Section 6.2.2.2.3.1.

6.2.2.2.1. 'Goal oriented motives' predicting effort in the Chilean sample

As can be seen in Table 6.10, of the 12 'goal oriented motives' considered, *performance approach driven by feeling able* was the only one found to be relevant in Chileans. It had a negative predictive effect, lowering the likelihood of observing these students investing mid- (RRR=0.26, SE=0.09, Z=-4.12, p=0.000) and high levels of *effort* (RRR=0.17, SE=0.13, Z=-2.41, p=0.016) rather than low *effort*.

Table 6.10 'Goal oriented motives' and their predictive power over effort. Chile.

Level of effort	Goal oriented motive	Relative risk ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
1. No effort observed (either because it is not needed or decides not to persist).	Category excluded from analysis ✪						
2. Occasional or low intensity effort when needed	Reference category/level						
3. Frequent or mid level of effort when needed	Parental education (in yrs)	0.29	0.64	-0.56	0.572	0.00	21.54
	Parental education (in yrs and quadratic form)	1.04	0.09	0.50	0.618	0.88	1.24
	Effortful learning approach - Learning	0.85	0.17	-0.84	0.401	0.57	1.25
	Effortful learning approach - Performing high(er)	1.24	0.56	0.49	0.625	0.52	2.99
	Performance approach - Learning	1.33	0.58	0.66	0.508	0.57	3.13
	Performance approach - Helping others to learn	1.99	1.18	1.16	0.245	0.62	6.38
	Performance approach - Performing high(er)	1.38	0.48	0.92	0.358	0.69	2.74
	Performance approach - Feeling able	0.26	0.09	-4.12	**0.000*** **	0.14	0.49
	Performance approach - Relate	0.54	0.32	-1.03	0.302	0.17	1.73
	Effortful learning avoidance - Avoiding feeling unable	0.38	0.32	-1.16	0.246	0.07	1.95
	Performance avoidance - Learning	1.49	0.80	0.75	0.456	0.52	4.28
	Performance avoidance - Performing high(er)	0.38	0.34	-1.08	0.282	0.06	2.24
	Performance avoidance - Avoiding feeling unable	0.91	0.18	-0.50	0.618	0.62	1.33
	Performance avoidance - Relate	1.38	0.43	1.03	0.305	0.75	2.55
4. Consistent or high intensity effort when needed	Parental education (in yrs)	1.03	2.14	0.01	0.988	0.02	60.20
	Parental education (in yrs and quadratic form)	1.00	0.09	-0.03	0.975	0.84	1.18
	Effortful learning approach - Learning	1.02	0.27	0.07	0.942	0.61	1.70
	Effortful learning approach - Performing high(er)	1.09	0.71	0.13	0.895	0.30	3.91
	Performance approach - Learning	1.44	0.59	0.87	0.382	0.64	3.23
	Performance approach - Helping others to learn	1.56	0.78	0.88	0.378	0.58	4.17
	Performance approach - Performing high(er)	1.51	0.61	1.00	0.315	0.68	3.35
	Performance approach - Feeling able	0.17	0.13	-2.41	**0.016** **	0.04	0.72
	Performance approach - Relate	1.45	0.84	0.64	0.524	0.47	4.50
	Effortful learning avoidance - Avoiding feeling unable	1.83	2.59	0.43	0.668	0.12	29.09
	Performance avoidance - Learning	0.35	0.31	-1.19	0.235	0.06	1.98
	Performance avoidance - Performing high(er)	0.71	0.69	-0.35	0.726	0.11	4.79
	Performance avoidance - Avoiding feeling unable	1.21	0.36	0.64	0.524	0.68	2.15
	Performance avoidance - Relate	0.85	0.33	-0.42	0.672	0.39	1.83

(in bold) Significant predictive relationships (p<0.05**; p<0.001***) between goal oriented motives and effort.

* Near to significant predictive relationship (p<0.07) between goal oriented motives and effort.

✪ This category was excluded from analysis due to its problematic measurement design. The category was scored when children did not persist in the face of difficulties as well as when there were no difficulties for which persistence was required. The level was excluded from analysis to avoid difficulties in the interpretation of results.

6.2.2.2.2. 'Goal oriented motives' predicting effort in the English sample

Unlike in the Chilean sample, many 'goal oriented motives' were found to have statistically significant effects over *effort* within English participants (see Table 6.11). *Effortful learning avoidance driven by avoiding feeling unable* had a positive effect over *effort*, enhancing the odds of investing a mid- rather than a low level of *effort* in these students (RRR=3.53, SE.=1.44, Z=3.09, p=0.002). *Performance approach driven by* either *learning* or *relating to others* proved to have negative predictive effects over *effort*, lowering the likelihood of observing English students investing a high rather than low level of *effort* (RRR=0.38, SE=0.16, Z=-2.24, p=0.025 and RRR=0.39, SE=0.12, Z=-3.07, p=0.002). *Effortful learning approach motivated by performing high(er)* had a complex relationship with *effort* in this sample. It enhanced for these students the chances of investing mid- rather than low levels of *effort* (RRR=2.72, SE.=0.91, Z=3.01, p=0.003), but lowered their odds of investing high rather than low levels of *effort* (RRR=0.32, SE.=0.15, Z=-2.48, p=0.013).

Table 6.11 'Goal oriented motives' and their predictive power over effort. England.

Level of effort	Goal oriented motive	Relative risk ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
1. No effort observed (either because it is not needed or decides not to persist).	Category excluded from analysis ✪						
2. Occasional or low intensity effort when needed	Reference category/level						
3. Frequent or mid level of effort when needed	Parental education (in yrs)	0.23	0.13	-2.63	**0.008****	0.08	0.69
	Parental education (in yrs and quadratic form)	1.05	0.02	2.94	**0.003****	1.02	1.09
	Effortful learning approach - Learning	0.64	0.15	-1.92	0.054*	0.41	1.01
	Effortful learning approach - Performing high(er)	3.53	1.44	3.09	**0.002****	1.59	7.87
	Performance approach - Learning	1.24	0.27	0.96	0.339	0.80	1.91
	Performance approach - Helping others to learn	1.69	0.78	1.14	0.254	0.68	4.19
	Performance approach - Performing high(er)	0.78	0.11	-1.73	0.083	0.58	1.03
	Performance approach - Feeling able	1.85	0.67	1.70	0.090	0.91	3.78
	Performance approach - Relate	0.93	0.29	-0.23	0.822	0.51	1.72
	Effortful learning avoidance - Avoiding feeling unable	2.72	0.91	3.01	**0.003****	1.42	5.23
	Performance avoidance - Learning	0.86	0.29	-0.45	0.654	0.45	1.66
	Performance avoidance - Performing high(er)	1.64	0.50	1.62	0.105	0.90	2.99
	Performance avoidance - Avoiding feeling unable	1.31	0.59	0.61	0.544	0.55	3.15
	Performance avoidance - Relate	0.97	0.28	-0.11	0.914	0.55	1.71
4. Consistent or high intensity effort when needed	Parental education (in yrs)	3.31	2.63	1.51	0.132	0.70	15.72
	Parental education (in yrs and quadratic form)	0.96	0.02	-1.57	0.117	0.92	1.01
	Effortful learning approach - Learning	1.98	0.93	1.45	0.146	0.79	4.97
	Effortful learning approach - Performing high(er)	0.32	0.15	-2.48	**0.013****	0.13	0.79
	Performance approach - Learning	0.38	0.16	-2.24	**0.025****	0.16	0.89
	Performance approach - Helping others to learn	0.87	0.91	-0.13	0.895	0.11	6.83
	Performance approach - Performing high(er)	1.05	0.30	0.19	0.852	0.60	1.85
	Performance approach - Feeling able	0.43	0.47	-0.78	0.438	0.05	3.58
	Performance approach - Relate	0.39	0.12	-3.07	**0.002****	0.22	0.71
	Effortful learning avoidance - Avoiding feeling unable	1.22	1.09	0.23	0.821	0.21	7.05
	Performance avoidance - Learning	0.81	0.41	-0.41	0.682	0.30	2.20
	Performance avoidance - Performing high(er)	0.90	0.53	-0.17	0.862	0.29	2.84
	Performance avoidance - Avoiding feeling unable	1.77	0.91	1.12	0.263	0.65	4.83
	Performance avoidance - Relate	0.48	0.31	-1.13	0.257	0.14	1.70

(in bold) Significant predictive relationships (p<0.05**; p<0.001***) between goal oriented motives and effort.

* Near to significant predictive relationship (p<0.07) between goal oriented motives and effort.

✪ This category was excluded from analysis due to its problematic measurement design. The category was scored when children did not persist in the face of difficulties as well as when there were no difficulties for which persistence was required. The level was excluded from analysis to avoid difficulties in the interpretation of results.

6.2.2.2.3. Summary

As has been reported in this section, some 'goal oriented motives' were found to predict the enhancement and lowering of the chance of observing Chilean and English students' investing higher levels of *effort* when facing challenges. Most of these effects, however, were found among English students. Table 6.12 shows the predictive effects found, their direction and strength. In

order to aid interpretation, the table also shows those motivational constructs that the predictive goal oriented motives can be argued to represent (Section 4.1.2).

Table 6.12 Summary of main effects of 'goal oriented motives' over effort. Chile and England.

	'Goal oriented motives' predicting Effort	Effects found	Level estimated (reference level 2 'occasional effort')	Similar concepts to predictive attitude
Chile - Predictors enhancing chances of higher Effort				
	None			
Chile - Predictors lowering chances of higher Effort				
1	Performance approach driven by feeling able	RRR 0.26***(C.I. 0.14-0.49)	3 mid-level	Performance approach
		RRR 0.17** (C.I. 0.04-0.72)	4 high level	
England - Predictors enhancing chances of higher Effort				
2	Effortful learning avoidance driven by avoiding feeling unable	RRR 2.72** (C.I. 1.42-5.23)	3 mid-level	Fear of failure (mastery and performance avoidance)
England - Predictors lowering chances of higher Effort				
3	Performance approach driven by learning	RRR 0.38** (C.I. 0.16-0.89)	4 high level	Mix of mastery and performance orientation
4	Performance approach driven by relating to others	RRR 0.39** (C.I. 0.22-0.71)	4 high level	Mix of performance orientation and relatedness / social affiliation goal
England - Predictors with mixed (quadratic) effects				
5	Effortful learning approach driven by performing high(er)	RRR 3.53** (C.I. 1.59-7.87)	3 mid-level	Performance approach
		RRR 0.32** (C.I. 0.13-0.79)	4 high level	

** p<0.05; *** p<0.001

As Table 6.12 shows, the only 'goal oriented motive' found to predict *effort* among Chilean students was *performance approach driven by feeling able*. This attitude, considered to represent performance approach, lowered the chances of observing Chilean students investing higher levels of *effort* when facing difficulties.

In the case of English students, two 'goal oriented motives' were found to have a positive predictive effect over *effort*. One of them was *effortful learning avoidance driven by avoiding feeling unable*, which represented a fear of failure (related to either mastery avoidance or performance avoidance orientations) – as it was expressed by interviewees mainly in order to communicate disliking friendly others pointing out their own mistakes to them (see Appendix 6.3.1) (effect n.2, Table 6.12). Moreover, *effortful learning approach driven by performing high(er)*, considered to represent performance approach orientation, was found to have a mixed (quadratic) predictive effect over *effort*. While it was found to enhance the chances of students investing a mid-level of *effort*, it also was found to lower the chances of students' investing consistent or high intensity levels of *effort* (effect n.5, Table 6.12). Together, these two attitudes evidence how mid-level *effort* could be the maximum level of effort that positive productivity of performance approach and fear of failure could predict among English students.

Furthermore, two 'goal oriented motives' were found to lower the chances of observing English students investing higher levels of *effort*. These were *performance approach driven by learning* and *performance approach driven by relating to others* (effects n.3 and n.4 in Table 6.12). These

'goal oriented motives' reflect mixes between performance approach on the one hand, and mastery or social goal orientations on the other. In particular, they represent attitudes that give mastery and a pro-social meaning to the demonstration of performance.

6.2.2.2.3.1. Similarities and differences between Chilean and English samples

As shown in Table 6.13, below, while four 'goal oriented motives' were found to be predictive of *effort* investment in English students, only one was found to have an effect over *effort* in Chileans. Some of these attitudes had a positive predictive effect over *effort* in English students but none of them had such an effect in Chilean students. Moreover, although it was not possible to find either similar or opposite functionalities of specific 'goal oriented motives' over students' *effort* directly across cultures, there were some interpretable similarities and differences worth pointing out.

First, when predicting the chances of students' investing high levels of *effort*, 'goal oriented motives' representing a performance approach (*effortful learning approach driven by performing high(er)*, and *performance approach driven by feeling able*) were found to lower the chances of observing students investing high rather than low levels of *effort* in both samples. Second, it was also possible to unveil cultural differences in the effects of these very same *performance approach* 'goal oriented motives', but when analysed as predicting mid- instead of high levels of *effort*. While *performance approach driven by feeling able* was found to lower the chances of Chilean students investing a mid-level *effort*, *effortful learning approach driven by performing high(er)* other was found to enhance them among English students.

Table 6.13 Comparison of 'goal oriented motives' predicting effort in Chilean and English participants

Goal oriented motives	Chile		England	
	Direction of predictive effect on effort	Level of effort predicted relative to base level of 'low effort' (level 2)✢	Direction of predictive effect on effort	Level of effort predicted relative to base level of 'low effort' (level 2)✢
Effortful learning approach - Performing high(er)	-	-	Enhancing/Lowering	3rd** ↑ & 4th** ↓
Effortful learning avoidance - Avoiding feeling unable	-	-	Enhancing	3rd**
Performance approach - Learning	-	-	Lowering	4th**
Performance approach - Relate	-	-	Lowering	4th**
Performance approach - Feeling able	Lowering	3rd*** & 4th**	-	-

** Significant at p<0.05 level; *** Significant at p<0.001 level

✢The base 2, or 2nd level, indicates occasional investment of effort; 3rd level indicates frequent investment of effort and; 4th level indicates consistent or high intensity investment of effort

Direction of predictive effect indicates the effect of increments in expressing goal oriented motive over chances of investing higher effort than 'occasional effort'

In general, in relation to English students, it is possible to say that performance orientations (approach and avoidance) are productive for their investment of mid levels of *effort*. Nevertheless, when English students gave either a more mastery or pro-social meaning to the demonstration of performance (mixing orientations), or when the level of *effort* predicted

changed from mid- to high level, the function of performance approach on *effort* became negative. As a consequence, it is reasonable to say that the function of performance orientations over *effort* in English students varied according to the meaning that they gave to performance, or to the intensity of *effort* predicted. In Chilean students, on the other hand, a 'goal oriented motive' indicative of performance approach (i.e. *performance approach driven by feeling able*), was found to be counterproductive for higher *effort* investment. When the results of both countries are contrasted, it is possible to see that, depending on the level of effort predicted, motivational attitudes indicative of performance approach orientation had similar or opposite functionality over *effort* across cultures. That is, it was similar when high levels of effort were predicted, but opposite when mid-levels of effort were predicted.

This research question has explored the role that achievement motivational attitudes might have over *effort* invested when facing challenges in children educated in different cultures. The exploration has provided evidence to sustain that same motivational attitudes are likely to have different pragmatic function over persistence needed to sustain self-regulation across cultures. Throughout the exploration of the next research question, the way in which the studied motivational attitudes were productive or counterproductive for students' engagement in key self-regulatory behaviours is reported.

6.2.3. RQ6. How and to what extent does the motivational role that achievement motivational attitudes have for self-regulatory behaviours vary between Chilean and English 8 to 9 year-old students?

Through this research question, the function of motivational attitudes on self-regulatory behaviours were explored across cultures. To simplify an already complex enquiry, only some self-regulatory behaviours were considered as outcomes: *planning during (order)*, *awareness of errors*, and *asking for help*. These three behaviours were the only ones found to be predictive of task achievement (i.e. *final task accuracy*) in similar fashions across countries. This made them ideal behaviours to select in order to explore whether motivational attitudes had culture-specific functionalities for self-regulation or not. This is because it allowed for the simplification of the interpretations of results by maintaining constant across cultures the productive effects of the behaviours themselves. They also represented different components of self-regulation that are highly distinctive from each other, as well as theoretically relevant. *Planning during*, for example, represented metacognitive control;[38] *awareness of errors* represented metacognitive

[38] Note that this behaviours represented organisation in Chile and effective control in England, two types of 'control' factors.

monitoring; and *asking for help* represented not only metacognitive control but also a type of control that is carried out by requesting co-regulation from others.

Similar to the analysis carried out for R.Q.5, the adequacy of two different models to predict self-regulatory behaviours was examined in each sample. One model considering 'orientations' and 'achievement motives' as attitudinal predictors, and another model considering only 'goal oriented motives' as attitudinal predictors. As previously indicated, given that the two models included the same information operationalized in different ways ('goal oriented motives' represented combinations of 'orientations' and 'achievement motives'), to avoid considering the same information twice only one of these models was selected and reported upon in full. The extent to which the two models (controlled by *parental education*) explained the variance of *planning during (order)*, *awareness of errors*, and *asking for help* observed in participating students was estimated through McFadden's pseudo R square (Hosmer et al., 2013).[39] Table 6.14 shows the explanatory models compared and their corresponding pseudo R squares.

Table 6.14 Proportion of variance (pseudo R squares) of Self-regulatory behaviours explained by 'Orientations' and 'Achievement motives' v. 'Goal oriented motives'; Chile and England

Explained variable:	Planning during (order)		Awareness of errors		Asking for help	
Explanatory model	Chile	England	Chile	England	Chile	England
1. Orientations + Achievement motives	0.049	0.049	**0.102***	0.147	**0.074***	0.123
2. Goal oriented motives	**0.052***	**0.075***	0.091	**0.197***	0.057	**0.129***

*In bold: pseudo R square of model explaining the most variance

As can be seen from Table 6.14 above, while the model using 'goal oriented motives' as predictors was more explanatory (albeit marginally) of *planning during (order)* across countries, no particular model was found to be consistently more explanatory of *awareness of errors* and *asking for help* across samples. In order to make results comparable across countries, however, one and the same model had to be compared across samples. Therefore, in order to choose the most adequate predictive model of *awareness of errors* and *asking for help*, the two alternative models were tested over the overall sample (pooling Chilean and English students together). Table 6.15 shows pseudo R squares of the two motivational models (controlled by *parental education*) when used to predict *awareness of errors* and *asking for help* over the pooled sample.

Table 6.15 Proportion of variance (pseudo R squares) of Awareness of errors and 'Asking for help' explained by 'Orientations' and 'Achievement motives' v. 'Goal oriented motives'; Overall sample

[39] As already mentioned for R.Q.5, this measure is similar to the conventional R square, but specially designed for logistic regressions. Alike R square, it ranges from 0 to 1, where 1 indicates total explanation of the predicted outcome variable, and 0 a null explanation.

Explained variable:	Awareness of errors	Asking for help
Explanatory model	Chile + England	Chile + England
1. Orientations + Achievement motives	0.080	**0.036***
2. Goal oriented motives	**0.087***	0.034

*In bold: pseudo R square of model explaining the most variance

As can be seen from Table 6.15, while 'goal oriented motives' were slightly more explanatory of *awareness of errors*, 'orientations' together with 'achievement motives' were slightly more explanatory of *asking for help*.[40] Considering the results reported in both Table 6.14 and Table 6.15, 'goal oriented motives' were used as predictors of *planning during (order)* and *awareness of errors*, but 'orientations' together with 'achievement motives' were used as predictors of *asking for help*.

Similar to R.Q.5, multinomial regressions were considered to be a good fit for purpose because the data violated the assumption of proportional odds but met the assumption of independence of irrelevant alternatives (Appendix 5.3.1). These regressions provided information about how student expression of a particular achievement motivational attitude predicted the odds of observing a student demonstrating a self-regulatory behaviour to a level higher than 'low' or 'very low' (depending on target behaviour). This was particularly beneficial for identifying any non-linear effects of motivation on self-regulation. To make results comparable between country samples, the same group of motivational attitudes and *parental education* (as a control variable) were included as simultaneous predictors of self-regulatory behaviours in multiple multinomial regressions run in both countries. This simultaneous consideration of attitudinal predictors also allowed for the estimation of independent effects of each motivational attitude over and above that of other considered motivational attitudes. All achievement motivational attitudes considered to be sufficiently present in both country samples (Section 6.1) were included. Moreover, in order to account for the fact that single motivational attitudes scores were used to predict students' self-regulation in their involvement in various different tasks (around 11 to 13 per student; around 300 per country sample), estimation errors were clustered at the level of each student.

As has been mentioned before, self-regulatory behaviours were measured on a scale that ranged from 1 to 4, where 4 indicated higher quality or a higher frequency of the behaviour assessed (Section 4.1.1.1). Some levels on these behavioural scales were rarely observed in students.

[40] Although not directly related to point explored, it is interesting to note that when students from the two countries are pooled together, achievement motivational attitudes are substantially less predictive than when they are considered separately (e.g., explaining 8.7% of the variance of awareness of errors rather than 19.7% or 14.7% among English and Chilean students separately). This could be considered to be evidence of the culture specificity of the functionality of achievement motivational attitudes over students' self-regulation.

Therefore, in order to ensure sufficient degrees of freedom for regression calculations, any scale level found to have frequencies too low to allow convergence in regression calculations had to be removed from the analysis. Table 6.16 shows the extent to which the different levels of the 1-4 scale were used when measuring English and Chilean students *planning during (order)*, *awareness of errors*, and *asking for help* behaviours.

Table 6.16 Frequencies of observed levels of self-regulatory behaviours per country

Scale level	Plan during (order)		Awareness of errors		Asking for help	
	Chile	England	Chile	England	Chile	England
Level 1	**10**	**10**	34	22	267	295
Level 2	39	36	48	41	29	17
Level 3	89	76	34	23	**5**	**3**
Level 4	163	193	97	120	**0**	**0**

In bold: Low frequencies.

As can be seen in Table 6.16 (see numbers in bold), it was unlikely that level 1 would be observed when assessing *planning during (order)* across students from both samples. Additionally, levels 3 and 4 of the scale of *asking for help* were either not observed or rarely observed across students from both country samples. Finally, all four levels of *awareness of errors* were found to an adequate degree among students from both country samples. Therefore, level 1 of *planning during (order)*, and level 3 and 4 of *asking for help* had to be excluded from the analysis carried out to answer R.Q.6 in both country samples.

To aid the interpretation of the results about to be presented, it might be helpful to remind the reader what higher levels of the self-regulatory behaviours predicted represent. First, higher levels of *planning during (order)* indicate that students were observed during a greater proportion of the task following a more systematic approach to building a figure (e.g. building edges first, or going from left to right, base to top, column by column, etc.) as opposed to an unsystematic or trial and error approach. Second, higher levels of *awareness of errors* indicate that, following the wrong placing or colour selection of a cube (in relation to target model, and as detected by rater), students tended to notice higher proportions of their own mistakes, as indicated by their re-manipulation of misplaced cubes in an attempt to re-place them. This rating was carried out independent of students' effectiveness in the control of their mistakes. Finally, higher levels of *asking for help* indicate that, instead of working completely autonomously, students asked for the assistance, reinforcement, or evaluation by the researcher occasionally. Therefore, higher levels of this behaviour represent more frequent seeking of clues and direct help, a type of help-seeking that has been labelled as dependency-oriented help-seeking (see Newman, 2002; Stodolsky, 1988).

The following sections include information about the effects found of achievement motivational attitudes on *planning during (order)*, *awareness of errors*, and *asking for help*. The results of the multiple multinomial regression are presented in tables. All multinomial regression tables presented display the effects of *parental education* (shown but not reported or discussed in writing), as well as the relevance of achievement motivational attitudes, over the self-regulatory behaviour of interest (see significant effects p>0.050** or p>0.001*** highlighted in bold). Results are presented by country, starting first with Chile, before moving to England, and finally offering some comparisons between the two. For a summary and comparison of results across countries, see Table 6.28.

6.2.3.1. Effects of achievement motivational attitudes on self-regulatory behaviours in the Chilean sample

Within this section, the predictive power of achievement motivational attitudes on *planning during (order)*, *awareness of errors*, and *asking for help* in participating students from Chile is reported.

6.2.3.1.1. Effects on planning during (order) within Chile

The results in Table 6.17 show that *planning during (order)* (also referred to as *planning*) was more likely to be observed to a level higher than very low in Chilean students when they expressed the 'goal oriented motives' of *performance approach driven by feeling able* (RRR=1.87, SE=0.52, Z=2.25, p=0.024) or *performance avoidance driven by performing high(er)* (RRR=7.41, SE=4.28, Z=3.47, p=0.001). These motivational attitudes were found to make more likely students' high and mid-levels of *planning*, respectively. On the contrary, only one 'goal oriented motive' was found to have negative effect on *planning during (order)* in the Chilean sample, namely *effortful learning avoidance driven by avoiding feeling unable*. This attitude lowered the likelihood of observing a mid- rather than a low level of *planning* (RRR=0.18, SE=0.13, Z=-2.28, p=0.023).

6.2.3.1.2. Effects on awareness of errors within Chile

As shown in Table 6.18, *Awareness of errors* was more likely to be observed to a level higher than very low in Chilean students when in their interviews they expressed ideas indicative of the 'goal oriented motive' of *effortful learning approach driven by learning*. This 'goal oriented motive' predicted low, middle, and high levels of *awareness of errors* (RRR=2.33, SE=0.69, Z=2.86, p=0.004; RRR=2.78, SE=0.97, Z=2.93, p=0.003, and RRR=3.76, SE=1.22, Z=4.08, p=0.000, respectively). No 'goal oriented motives' were found to significantly lower the chances of students demonstrating higher levels of *awareness of errors* among Chilean students.

Table 6.17 Multinomial regression - Effects of 'goal oriented motives' on planning during (order) in Chile

Level of planning during (order)	Goal oriented motive	Relative risk ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
1.Poor level. Child approaches task without a plan, uses trial an error method.	Category excluded from analysis ✪						
2. Low level. Child works with a clear plan only occasionally.	Reference category/level						
3. Mid-level. Most of the time child seems to works with a clear plan.	Parental education (in yrs)	1.07	0.48	0.14	0.888	0.44	2.60
	Parental education (in yrs and quadratic form)	1.00	0.01	-0.12	0.901	0.97	1.03
	Effortful learning approach - Learning	0.86	0.23	-0.56	0.573	0.51	1.46
	Effortful learning approach - Performing high(er)	0.12	0.07	-3.72	**0.000*** **	0.04	0.36
	Performance approach - Learning	2.37	0.98	2.09	**0.037** **	1.05	5.32
	Performance approach - Helping others to learn	8.13	3.30	5.17	**0.000*** **	3.67	18.00
	Performance approach - Performing high(er)	1.67	0.29	2.99	**0.003** **	1.19	2.33
	Performance approach - Feeling able	1.93	1.00	1.28	0.200	0.70	5.30
	Performance approach - Relate to others	1.09	0.30	0.31	0.754	0.63	1.87
	Effortful learning avoidance - Avoiding feeling unable	0.53	0.33	-1.02	0.309	0.16	1.79
	Performance avoidance - Learning	1.87	0.96	1.21	0.225	0.68	5.12
	Performance avoidance - Performing high(er)	1.43	0.71	0.71	0.478	0.53	3.81
	Performance avoidance - Avoiding feeling unable	0.95	0.25	-0.20	0.839	0.56	1.60
	Performance avoidance - Relate to others	1.61	0.43	1.78	0.075	0.95	2.72
4.High level. Child works with a clear plan throughout the whole task.	Parental education (in yrs)	1.50	0.58	1.04	0.300	0.70	3.22
	Parental education (in yrs and quadratic form)	0.99	0.01	-0.60	0.552	0.97	1.02
	Effortful learning approach - Learning	1.34	0.32	1.24	0.214	0.84	2.14
	Effortful learning approach - Performing high(er)	0.19	0.12	-2.74	**0.006** **	0.06	0.63
	Performance approach - Learning	2.78	1.23	2.31	**0.021** **	1.17	6.63
	Performance approach - Helping others to learn	3.62	1.62	2.87	**0.004** **	1.50	8.70
	Performance approach - Performing high(er)	1.48	0.25	2.33	**0.020** **	1.06	2.06
	Performance approach - Feeling able	0.96	0.41	-0.10	0.920	0.41	2.24
	Performance approach - Relate to others	0.83	0.28	-0.55	0.584	0.44	1.59
	Effortful learning avoidance - Avoiding feeling unable	1.15	0.46	0.36	0.718	0.53	2.52
	Performance avoidance - Learning	0.53	0.29	-1.17	0.242	0.18	1.54
	Performance avoidance - Performing high(er)	0.98	0.49	-0.04	0.965	0.36	2.63
	Performance avoidance - Avoiding feeling unable	0.90	0.26	-0.36	0.722	0.51	1.60
	Performance avoidance - Relate to others	1.13	0.27	0.51	0.608	0.71	1.81

** / *** (In bold): Significant prediction at p<0.05** or p<0.001*** of the indicated 'goal oriented motive' on *planning during (order)* at the predicted level.

✪ Level 1 was excluded from analysis due to insufficient frequency of observations to allow for regression estimations.

Table 6.18 Multinomial regression - Effects of 'goal oriented motives' on awareness of errors in Chile

Level of awareness of errors	Goal oriented motive	Relative risk ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
1.Very low level. Child realises about none or a very small number of errors.	Reference category/level						
2. Low level. Child passes over most errors, realises only about some of them OR feels something is wrong but does not know what.	Parental education (in yrs)	138.68	257.73	2.65	**0.008****	3.63	5296.10
	Parental education (in yrs and quadratic form)	0.83	0.06	-2.64	**0.008****	0.72	0.95
	Effortful learning approach - Learning	2.33	0.69	2.86	**0.004****	1.30	4.15
	Effortful learning approach - Performing high(er)	2.33	1.19	1.65	0.099	0.85	6.35
	Performance approach - Learning	1.55	0.79	0.87	0.387	0.57	4.21
	Performance approach - Helping others to learn	0.51	0.28	-1.22	0.221	0.18	1.49
	Performance approach - Performing high(er)	1.40	0.72	0.66	0.512	0.51	3.84
	Performance approach - Feeling able	0.23	0.30	-1.11	0.265	0.02	3.04
	Performance approach - Relate to others	0.37	0.22	-1.71	0.088	0.12	1.16
	Effortful learning avoidance - Avoiding feeling unable	0.64	0.89	-0.32	0.747	0.04	9.71
	Performance avoidance - Learning	2.91	2.93	1.06	0.288	0.41	20.92
	Performance avoidance - Performing high(er)	0.11	0.16	-1.53	0.125	0.01	1.84
	Performance avoidance - Relate to others	1.47	0.47	1.18	0.237	0.78	2.76
3. Mid-level. Child realises about most errors, passes over only a few of them.	Parental education (in yrs)	207.55	438.93	2.52	**0.012****	3.29	13099.69
	Parental education (in yrs and quadratic form)	0.82	0.07	-2.42	**0.016****	0.69	0.96
	Effortful learning approach - Learning	2.78	0.97	2.93	**0.003****	1.40	5.52
	Effortful learning approach - Performing high(er)	2.12	1.53	1.04	0.298	0.52	8.71
	Performance approach - Learning	1.78	1.30	0.79	0.429	0.43	7.42
	Performance approach - Helping others to learn	0.46	0.35	-1.01	0.313	0.10	2.08
	Performance approach - Performing high(er)	1.13	0.94	0.14	0.887	0.22	5.78
	Performance approach - Feeling able	0.25	0.45	-0.77	0.443	0.01	8.52
	Performance approach - Relate to others	0.25	0.19	-1.81	0.070	0.06	1.12
	Effortful learning avoidance - Avoiding feeling unable	0.79	1.83	-0.10	0.919	0.01	74.07
	Performance avoidance - Learning	2.53	3.80	0.62	0.535	0.13	47.76
	Performance avoidance - Performing high(er)	0.04	0.10	-1.43	0.153	0.00	3.19
	Performance avoidance - Relate to others	1.84	0.92	1.22	0.222	0.69	4.92
4.High level. Child is fully aware of errors.	Parental education (in yrs)	1307.23	2971.43	3.16	**0.002****	15.19	112512.50
	Parental education (in yrs and quadratic form)	0.76	0.07	-3.10	**0.002****	0.64	0.90
	Effortful learning approach - Learning	3.76	1.22	4.08	**0.000****	1.99	7.10
	Effortful learning approach - Performing high(er)	2.96	1.91	1.68	0.093	0.83	10.50
	Performance approach - Learning	1.39	1.02	0.44	0.658	0.33	5.88
	Performance approach - Helping others to learn	0.58	0.47	-0.67	0.505	0.12	2.84
	Performance approach - Performing high(er)	1.34	1.02	0.39	0.700	0.30	5.94
	Performance approach - Feeling able	0.17	0.27	-1.12	0.265	0.01	3.82
	Performance approach - Relate to others	0.22	0.17	-1.94	0.053	0.05	1.02
	Effortful learning avoidance - Avoiding feeling unable	1.47	3.07	0.18	0.855	0.02	88.76
	Performance avoidance - Learning	2.22	3.26	0.54	0.588	0.12	39.46
	Performance avoidance - Performing high(er)	0.05	0.11	-1.36	0.175	0.00	3.79
	Performance avoidance - Relate to others	1.66	1.02	0.83	0.406	0.50	5.52

** / *** (In bold): Significant prediction at p<0.05** or p<0.001*** of the indicated 'goal oriented motive' on *awareness of errors* at the predicted level.

6.2.3.1.3. *Effects of asking for help within Chile*

In relation to *asking for help*, as Table 6.19 shows, the results suggest that this behaviour is not predicted by achievement motivational attitudes ('orientations' and 'achievement motives') in Chilean students.

Table 6.19 Multinomial regression - Effects of 'orientations' and 'achievement motives' on asking for help in Chile

Level of asking for help	Orientation / Achievement motive	Relative risk ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
1. Very low level. Works autonomously, does not seek assistance, reinforcement or evaluation from researcher.	Reference category/level						
2. Low level. Occasionally seeks assistance, reinforcement or evaluation from researcher.	Parental education (in yrs)	0.01	0.02	-2.42	**0.016****	0.00	0.43
	Parental education (in yrs and quadratic form)	1.18	0.08	2.39	**0.017****	1.03	1.36
	Effortful learning approach	0.98	0.29	-0.06	0.950	0.55	1.77
	Effortful learning avoidance	0.73	0.23	-0.98	0.327	0.39	1.36
	Performance approach	0.68	0.24	-1.08	0.280	0.34	1.37
	Performance avoidance	1.28	0.38	0.82	0.415	0.71	2.30
	Learning	0.77	0.16	-1.32	0.187	0.51	1.14
	Helping others to learn	2.21	1.39	1.27	0.205	0.65	7.55
	Performing high(er)	0.80	0.27	-0.65	0.517	0.41	1.57
	Feeling able	1.19	0.92	0.22	0.823	0.26	5.42
	Avoiding feeling unable	1.12	0.29	0.44	0.660	0.67	1.86
	Relate to others	0.80	0.33	-0.55	0.586	0.36	1.79
3. Mid-level. Often asks for assistance, reinforcement or evaluation of researcher. Feels uncertain.	Category excluded from analysis ✪						
4. High level. Continuously asks for assistance, reinforcement or evaluation from researcher.	Category excluded from analysis ✪						

** / *** (In bold): Significant prediction at p<0.05** or p<0.001*** of the indicated 'orientation' or 'achievement motive' on *asking for help* at the predicted level.

✪ Level 3 and 4 were excluded from analysis due to insufficient frequency of observations to allow for regression estimations in reference to these levels.

6.2.3.1.3.1. Summary

The findings reported above and summarized in Table 6.20 below show that, while within the Chilean sample some achievement motivational attitudes predicted *planning during (order)* and *awareness of errors*, none predicted *asking for help*. Specifically, the type of motivational attitudes found to be productive for *planning during (order)* were indicative of a performance approach (*performance approach driven by feeling able*) and a performance avoidance orientation (*performance avoidance driven by performing high(er)*). The motivational attitude enhancing the chances of higher *awareness of errors*, on the other hand, was reflective of mastery approach (*effortful learning approach driven by learning*).

Table 6.20 Summary of predictive effects of achievement motivational attitudes over self-regulatory behaviours in Chile

Predictors of Planning during (order)	**Effects found (Conf. interval)**	**Level estimated** (reference level 2 'occasional')	**Similar concepts to predictive attitude**
Predictors enhancing ↑ chances of higher planning during (order)			
1 Performance approach driven by feeling able	RRR 1.87** (C.I. 1.08-3.22)	4 high level	Performance approach
2 Performance avoidance driven by performing high(er)	RRR 7.41** (C.I. 2.39-22.96)	3 mid-level	Performance avoidance
Predictors lowering ↓ chances of higher planning during (order)			
3 Effortful learning avoidance driven by avoiding feeling unable	RRR 0.18** (C.I. 0.04-0.79)	3 mid-level	Fear of failure (mastery and performance avoidance)

Predictors of Awareness of errors	**Effects found (Conf. interval)**	**Level estimated** (reference level 1 'very low')	**Similar concepts to predictive attitude**
Predictors enhancing ↑ chances of higher awareness of errors			
4 Effortful learning approach driven by learning	RRR 2.33** (C.I. 1.30-4.15)	2 low level	Mastery approach
	RRR 2.78** (C.I. 1.40-5.52)	3 mid-level	
	RRR 3.76*** (C.I. 1.99-7.10)	4 high level	
Predictors lowering ↓ chances of higher awareness of errors			
No effects found			

Predictors of Asking for help	**Effects found (Conf. interval)**	**Level estimated** (reference level 1 'very low')	**Similar concepts to predictive attitude**
Predictors enhancing ↑ chances of higher asking for help			
No effects found			
Predictors lowering ↓ chances of higher asking for help			
No effects found			

** p<0.05; *** p<0.001

Moreover, the only motivational attitude found to demotivate students' self-regulatory behaviours was one indicative of fear of failure (*effortful learning avoidance driven by avoiding feeling unable*). This attitude lowered the chances of observing higher levels of *planning during (order)* in Chilean students.

6.2.3.2. Effects of achievement motivational attitudes on self-regulatory behaviours in the English sample

Within this section, the predictive power of achievement motivational attitudes on *planning during (order)*, *awareness of errors*, and *asking for help* in participating students from England is reported.

6.2.3.2.1. Effects on planning during (order) within England

As can be seen in Table 6.21, results show that in English students *planning during (order)* was more likely to be observed to a level higher than low when these students expressed ideas

indicative of the 'goal oriented motives' of *performance approach driven by* either *learning* (RRR=2.37, SE=0.98, Z=2.09, p=0.037; RRR=2.78, SE=1.23, Z=2.31, p=0.021), *helping others to learn* (RRR=8.13, SE=3.30, Z=5.17, p=0.000; RRR=3.62, SE=1.62, Z=2.87, p=0.004), or *performing high(er)* (RRR=1.67, SE=0.29, Z=2.99, p=0.003; RRR=1.48, SE=0.25, Z=2.33, p=0.020). Specifically, all these motivational attitudes enhanced the chances of students *planning* to mid- and high levels. On the contrary, this self-regulatory behaviour was less likely to be observed to a level higher than low in English students when they expressed ideas indicative of the 'goal oriented motive' of *effortful learning approach motivated by performing high(er)*. Specifically, this motivational attitude was found to make mid- and high levels of this behaviour less likely among students (RRR=0.12, SE=0.07, Z=-3.72, p=0.000 and RRR=0.19, SE=0.12, Z=-2.74, p=0.006).

Table 6.21 Multinomial regression - Effects of 'goal oriented motives' on planning during (order) in England

Level of planning during (order)	Goal oriented motive	Relative risk ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
1.Poor level. Child approaches task without a plan, uses trial an error method.	Category excluded from analysis ✪						
2. Low level. Child works with a clear plan only occasionally.	Reference category/level						
3. Mid-level. Most of the time child seems to works with a clear plan.	Parental education (in yrs)	1.07	0.48	0.14	0.888	0.44	2.60
	Parental education (in yrs and quadratic form)	1.00	0.01	-0.12	0.901	0.97	1.03
	Effortful learning approach - Learning	0.86	0.23	-0.56	0.573	0.51	1.46
	Effortful learning approach - Performing high(er)	0.12	0.07	-3.72	**0.000*** **	0.04	0.36
	Performance approach - Learning	2.37	0.98	2.09	**0.037** **	1.05	5.32
	Performance approach - Helping others to learn	8.13	3.30	5.17	**0.000*** **	3.67	18.00
	Performance approach - Performing high(er)	1.67	0.29	2.99	**0.003** **	1.19	2.33
	Performance approach - Feeling able	1.93	1.00	1.28	0.200	0.70	5.30
	Performance approach - Relate to others	1.09	0.30	0.31	0.754	0.63	1.87
	Effortful learning avoidance - Avoiding feeling unable	0.53	0.33	-1.02	0.309	0.16	1.79
	Performance avoidance - Learning	1.87	0.96	1.21	0.225	0.68	5.12
	Performance avoidance - Performing high(er)	1.43	0.71	0.71	0.478	0.53	3.81
	Performance avoidance - Avoiding feeling unable	0.95	0.25	-0.20	0.839	0.56	1.60
	Performance avoidance - Relate to others	1.61	0.43	1.78	0.075	0.95	2.72
4.High level. Child works with a clear plan throughout the whole task.	Parental education (in yrs)	1.50	0.58	1.04	0.300	0.70	3.22
	Parental education (in yrs and quadratic form)	0.99	0.01	-0.60	0.552	0.97	1.02
	Effortful learning approach - Learning	1.34	0.32	1.24	0.214	0.84	2.14
	Effortful learning approach - Performing high(er)	0.19	0.12	-2.74	**0.006** **	0.06	0.63
	Performance approach - Learning	2.78	1.23	2.31	**0.021** **	1.17	6.63
	Performance approach - Helping others to learn	3.62	1.62	2.87	**0.004** **	1.50	8.70
	Performance approach - Performing high(er)	1.48	0.25	2.33	**0.020** **	1.06	2.06
	Performance approach - Feeling able	0.96	0.41	-0.10	0.920	0.41	2.24
	Performance approach - Relate to others	0.83	0.28	-0.55	0.584	0.44	1.59
	Effortful learning avoidance - Avoiding feeling unable	1.15	0.46	0.36	0.718	0.53	2.52
	Performance avoidance - Learning	0.53	0.29	-1.17	0.242	0.18	1.54
	Performance avoidance - Performing high(er)	0.98	0.49	-0.04	0.965	0.36	2.63
	Performance avoidance - Avoiding feeling unable	0.90	0.26	-0.36	0.722	0.51	1.60
	Performance avoidance - Relate to others	1.13	0.27	0.51	0.608	0.71	1.81

** / *** (In bold): Significant prediction at p<0.05** or p<0.001*** of the indicated 'goal oriented motive' on *planning during (order)* at the predicted level.

6.2.3.2.2. Effects on awareness of errors in England

A more extensive and diverse group of achievement motivational attitudes were found to be relevant for *awareness of errors* in English students as opposed to their Chilean counterparts. Details about productive attitudes are presented before moving to those found to be unproductive for *awareness of errors*.

Results in Table 6.22 demonstrate that among the 'goal oriented motives' productive for *awareness of errors* and indicative of students wanting to reach a good level of performance were: *performance approach* or *performance avoidance* both *driven by performing high(er)*. The approach version of these attitudes was found to enhance the likelihood of students exhibiting low and high rather than very low levels of *awareness of errors* (RRR=2.09, SE=0.62, Z=2.48, p=0.013; and RRR=2.28, SE=0.62, Z=3.00, p=0.003, respectively). The avoidance version of this attitude was found to enhance the likelihood of students exhibiting mid- rather than very low levels of *awareness of errors* (RRR=3.94, SE=1.96, Z=2.75, p=0.006). In addition, *performance avoidance driven by relating to others* enhanced the likelihood of students showing low and mid- rather than very low levels of *awareness of errors* (RRR=2.93, SE=1.09, Z=2.89, p=0.004; and RRR=2.00, SE=0.53, Z=2.65, p=0.008, respectively). Finally, *effortful learning approach driven by learning* enhanced the chances of students being aware of errors to a high rather than very low level (RRR=2.96, SE=0.95, Z=3.38, p=0.001).

Table 6.22 Multinomial regression - Effects of 'goal oriented motives' on awareness of errors in England

Level of awareness of errors	Goal oriented motive	Relative risk ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
1 Very low level. Child realises about none or a very small number of errors.	Reference category/level						
2. Low level. Child passes over most errors, realises only about some of them OR feels something is wrong but does not know what.	Parental education (in yrs)	5.51	5.71	1.65	0.100	0.72	42.06
	Parental education (in yrs and quadratic form)	0.95	0.03	-1.49	0.135	0.89	1.02
	Effortful learning approach - Learning	1.40	0.57	0.83	0.404	0.63	3.10
	Effortful learning approach - Performing high(er)	0.14	0.12	-2.31	**0.021****	0.03	0.74
	Performance approach - Learning	0.59	0.28	-1.12	0.264	0.23	1.49
	Performance approach - Helping others to learn	0.28	0.35	-1.03	0.305	0.03	3.13
	Performance approach - Performing high(er)	2.09	0.62	2.48	**0.013****	1.17	3.75
	Performance approach - Feeling able	0.14	0.13	-2.10	**0.035****	0.02	0.87
	Performance approach - Relate to others	0.91	0.16	-0.56	0.578	0.64	1.29
	Effortful learning avoidance - Avoiding feeling unable	0.77	0.63	-0.32	0.749	0.15	3.87
	Performance avoidance - Learning ☆ ☆	0.36	0.27	-1.36	0.173	0.09	1.56
	Performance avoidance - Performing high(er)	0.60	0.40	-0.76	0.449	0.16	2.23
	Performance avoidance - Relate to others	2.93	1.09	2.89	**0.004****	1.41	6.08
3. Mid-level. Child realises about most errors, passes over only a few of them.	Parental education (in yrs)	17.71	15.20	3.35	**0.001****	3.29	95.28
	Parental education (in yrs and quadratic form)	0.92	0.03	-2.93	**0.003****	0.87	0.97
	Effortful learning approach - Learning	1.46	0.53	1.05	0.294	0.72	2.96
	Effortful learning approach - Performing high(er)	0.03	0.03	-3.87	**0.000*****	0.01	0.18
	Performance approach - Learning	0.96	0.39	-0.10	0.917	0.43	2.12
	Performance approach - Helping others to learn	1.58	1.28	0.56	0.574	0.32	7.71
	Performance approach - Performing high(er)	1.03	0.33	0.09	0.926	0.55	1.94
	Performance approach - Feeling able	0.51	0.29	-1.17	0.241	0.17	1.56
	Performance approach - Relate to others	0.61	0.13	-2.28	**0.023****	0.40	0.93
	Effortful learning avoidance - Avoiding feeling unable	1.49	1.05	0.56	0.573	0.37	5.92
	Performance avoidance - Learning ☆ ☆	0.00	0.00	-7.29	**0.000*****	0.00	0.00
	Performance avoidance - Performing high(er)	3.94	1.96	2.75	**0.006****	1.48	10.47
	Performance avoidance - Relate to others	2.00	0.53	2.65	**0.008****	1.20	3.35
4.High level. Child is fully aware of errors.	Parental education (in yrs)	7.31	5.40	2.69	**0.007****	1.72	31.13
	Parental education (in yrs and quadratic form)	0.94	0.02	-2.22	**0.026****	0.90	0.99
	Effortful learning approach - Learning	2.96	0.95	3.38	**0.001****	1.58	5.56
	Effortful learning approach - Performing high(er)	0.03	0.02	-4.23	**0.000*****	0.01	0.15
	Performance approach - Learning	1.23	0.43	0.59	0.555	0.62	2.46
	Performance approach - Helping others to learn	1.33	0.87	0.44	0.662	0.37	4.77
	Performance approach - Performing high(er)	2.28	0.62	3.00	**0.003****	1.33	3.89
	Performance approach - Feeling able	0.19	0.10	-3.30	**0.001****	0.07	0.51
	Performance approach - Relate to others	0.49	0.07	-5.10	**0.000*****	0.37	0.64
	Effortful learning avoidance - Avoiding feeling unable	2.27	1.38	1.35	0.177	0.69	7.49
	Performance avoidance - Learning ☆ ☆	0.18	0.11	-2.77	**0.006****	0.05	0.61
	Performance avoidance - Performing high(er)	1.53	0.62	1.05	0.294	0.69	3.37
	Performance avoidance - Relate to others	1.18	0.25	0.80	0.424	0.78	1.79

** / *** (In bold): Significant prediction at p<0.05** or p<0.001*** of the indicated 'goal oriented motive' on *awareness of errors* at the predicted level.

☆ ☆ Note that the effect of this attitude could be considered to be irrelevant as it was found to be expressed only by one student within the English sample.

On the other hand, three attitudes were found to be counterproductive for *awareness of errors* in English students.[41] Specifically, the 'goal oriented motive' of *effortful learning approach driven by performing high(er)* was found to reduce the chances of English students exhibiting a low (RRR=0.14, SE=0.12, Z=-2.31. p=0.02), mid- (RRR=0.03, SE=0.03, Z=-3.87, p=0.000) or high (RRR=0.03, SE=0.02, Z=-4.23, p=0.000) rather than a very low level of *awareness of errors*. Also, *performance approach driven by feeling able* was found to decrease the chances of students showing a low (RRR=0.14, SE=0.13, Z=-2.10. p=0.035) or high (RRR=0.19, SE=0.10, Z=-3.30, p=0.001) rather than very low level of *awareness of errors*. English students were also less likely to become aware of their errors when they approached performance in order to build relationships. Specifically, *performance approach driven by relating to others* was found to lower the likelihood of English students reaching a mid- (RRR=0.61, SE=0.13, Z=-2.28. p=0.023) and high (RRR=0.49, SE=0.07, Z=-5.10, p=0.000) rather than a very low level of *awareness of errors*.

6.2.3.2.3. Effects on asking for help in England

Unlike the Chilean case, for English participants, at least one motivational attitude was found to be associated with *asking for help*. Specifically, the 'achievement motive' of *feeling able*, was found to have a counterproductive functionality over *asking for help*. Specifically, as Table 6.23 shows, expressing this motive lowered the chances of students *asking for help* occasionally rather than never (RRR=0.44, SE=0.18, Z=-1.99, p=0.047).

[41] Please note that *performance avoidance driven by learning* was also found to decrease the chances of observing English students reaching higher levels of *awareness of errors*. Nevertheless, given that only one student exhibited this attitude among the English sample (seeTable 6.3 finding should not be considered to be relevant for the whole sample but just for that particular student.

Table 6.23 Multinomial regression - Effects of 'orientations' and 'achievement motives' on asking for help in England

Level of asking for help	Goal orientation / achievement motive	Relative risk ratio	Robust Std. Err.	z	P>z	[95% Conf. Interval]	
1. Very low level. Works autonomously, does not seek assistance, reinforcement or evaluation from researcher.	Reference category/level						
2. Low level. Occasionally seeks assistance, reinforcement or evaluation from researcher.	Parental education (in yrs)	1.20	0.92	0.24	0.808	0.27	5.40
	Parental education (in yrs and quadratic form)	0.99	0.03	-0.30	0.763	0.94	1.04
	Effortful learning approach	1.38	0.34	1.31	0.190	0.85	2.22
	Effortful learning avoidance	0.65	0.27	-1.04	0.298	0.29	1.46
	Performance approach	0.78	0.20	-1.00	0.316	0.47	1.27
	Performance avoidance	0.51	0.18	-1.89	0.058	0.25	1.02
	Learning	1.16	0.53	0.33	0.740	0.48	2.84
	Helping others to learn	0.53	0.19	-1.78	0.075	0.26	1.07
	Performing high(er)	0.99	0.19	-0.07	0.943	0.68	1.44
	Feeling able	0.44	0.18	-1.99	**0.047****	0.20	0.99
	Avoiding feeling unable	1.59	0.82	0.90	0.367	0.58	4.38
	Relate to others	0.83	0.26	-0.60	0.548	0.46	1.52
3. Middle level. Often asks for assistance, reinforcement or evaluation of researcher. Feels uncertain.	Category excluded from analysis ✪						
4. High level. Continuously asks for assistance, reinforcement or evaluation from researcher.	Category excluded from analysis ✪						

** / *** (In bold): Significant prediction at p<0.05** or p<0.001*** of the indicated 'orientation' or 'achievement motive' on *asking for help* at the predicted level.

✪ Level 3 and 4 were excluded from analysis due to insufficient frequency of observations to allow for regression estimations in reference to these levels.

6.2.3.2.4. Summary

The findings reported above and summarized in Table 6.24 below show that, while within the English sample various achievement motivational attitudes predicted *planning during (order)* and *awareness of errors*, only one predicted *asking for help*.

In general, 'goal oriented motives' indicative of performance and mastery approach as well as social goals were found to relate to both *planning during (order)* and *awareness of errors*. Nevertheless, the way in which these attitudes were either productive or counterproductive for these self-regulatory behaviours was found at times to be inconsistent. Specifically, 'goal oriented motives' indicative of performance approach had positive and negative functionalities over self-regulatory behaviours. There also were some 'goal oriented motives' that represented social goals that also had inconsistent opposite functionalities over *awareness of errors*. These inconsistencies are indicated and summarised here but interpreted and discussed in Chapter 8.

In the case of *planning during (order)*, students' willingness to show their performance to others, either for learning, collaborative or performative reasons (outperforming or being socially recognized and rewarded), were found to be productive. These productive 'goal oriented motives' were considered to represent performance approach (*performance approach driven by interest in performing high(er)*) or a mix between performance approach and mastery (*performance approach driven by interest in learning*), or a collaborative attitude (*performance approach driven by interest in helping others*), respectively. Surprisingly, however, *effortful learning approach driven by performing high(er)*, another attitude thought to also represent performance approach (expressed in terms of proving to be better than others, meet social expectations, or avoid not showing good performance), was found to be counterproductive for *planning*.

In relation to *awareness of errors*, 'goal oriented motives' indicative of performance approach were also found to have both productive and counterproductive functions over this self-regulatory behaviour. As can be seen from Table 6.24, the same two 'goal oriented motives' found to cloud the prediction of performance approach over *planning* (*effortful learning approach driven by performing high(er)* and *performance approach driven by interest in performing high(er)*) confused in the exact same fashion the role of performance approach over *awareness of errors*.

In the case of those 'goal oriented motives' related to social goals, while *performance avoidance driven by relating to others* (i.e. withdrawing from showing performance to build personal relationships) had a productive functionality, its approach version, *performance approach driven by relating to others* (i.e. showing performance to build personal relationships, and which mixed social goals with performance orientation) was counterproductive. The inconsistency pointed out, however, could be said to only be apparent because, while withdrawing from performance for social reasons shows a pure commitment to social goals, engaging in performance approach to build relationships shows a somewhat stronger performance orientation.[42] The results strengthen the idea that, even when mixed with social goals, performance orientations are counterproductive for *awareness of errors* among English students. This negative effect of performance approach was also evidenced by the predictive effect of *effortful learning approach driven by performing high(er)*, which had a negative effect on *awareness of errors*. Furthermore, *effortful learning approach driven by learning*, considered to be indicative of mastery approach, had a productive functionality over *awareness of errors* among English students. However, when mastery approach was mixed with performance avoidance (*performance avoidance driven by*

[42] Students generally expressed wanting to demonstrate performance to build relationships not only in the sense of sharing with significant others what they were able to do (12 out of 29 expressions), but also in order to compare and compete with others as a way to gain their admiration and subsequent friendship (17 out of 29 expressions) (Appendix 6.3.3).

learning) it had a negative effect on *awareness of errors*. Finally, regarding *asking for help*, it is possible to say that no motivational attitudes were found to explain an enhancement in the chances of students asking more for help, but that the 'achievement motive' of *feeling able* had a counterproductive role over this behaviour.

Overall, the results suggest that while being more mastery oriented, collaborative, and focused on social goals is productive for self-regulation among English students, being more performance oriented either in terms of approach or avoidance had a counterproductive effect on self-regulation among these students.

Table 6.24 Summary of predictive effects of achievement motivational attitudes over self-regulatory behaviours in England

Predictors of Planning during (order)	Effects found (Conf. interval)	Level estimated (reference level 2 'occasional')	Similar concepts to predictive attitude
Predictors enhancing ↑ chances of higher planning during (order)			
1 Performance approach driven by interest in learning	RRR 2.37** (C.I. 1.05-5.32)	3 mid-level	Mix of mastery and performance orientation
	RRR 2.78** (C.I. 1.17-6.63)	4 high level	
2 Performance approach driven by interest in helping others to learn	RRR 8.13***(C.I. 3.67-18.00)	3 mid-level	Collaborative attitude
	RRR 3.62** (C.I. 1.50-8.70)	4 high level	
3 Performance approach driven by interest in performing high(er)	RRR 1.67** (C.I. 1.19-2.33)	3 mid-level	Performance approach
	RRR 1.48** (C.I. 1.06-2.06)	4 high level	
Predictors lowering ↓ chances of higher planning during (order)			
4 Effortful learning approach driven by interest in performing high(er)	RRR 0.12***(C.I. 0.04-0.36)	3 mid-level	Performance approach
	RRR 0.19** (C.I. 0.06-0.63)	4 high level	

Predictors of Awareness of errors	Effects found (Conf. interval)	Level estimated (reference level 1 'very low')	Similar concepts to predictive attitude
Predictors enhancing ↑ chances of higher awareness of errors			
5 Effortful learning approach driven by interest in learning	RRR 2.96** (C.I. 1.58-5.56)	4 high level	Mastery approach
6 Performance approach driven by interest in performing high(er)	RRR 2.09** (C.I. 1.17-3.75)	2 low level	Performance approach
	RRR 2.28** (C.I. 1.33-3.89)	4 high level	
7 Performance avoidance driven by interest in relating to others	RRR 2.93** (C.I. 1.41-6.08)	2 low level	Social goal (relatedness / affiliation)
	RRR 2.00** (C.I. 1.20-3.35)	3 mid-level	
Predictors lowering ↓ chances of higher awareness of errors			
8 Effortful learning approach driven by interest in performing high(er)	RRR 0.14** (C.I. 0.03-0.74)	2 low level	Performance approach
	RRR 0.03***(C.I. 0.01-0.18)	3 mid-level	
	RRR 0.03***(C.I. 0.01-0.15)	4 high level	
9 Performance approach driven by interest in feeling able	RRR 0.14** (C.I. 0.02-0.87)	2 low level	Performance approach
	RRR 0.19** (C.I. 0.07-0.51)	4 high level	
10 Performance approach driven by interest in relating to others	RRR 0.61** (C.I. 0.40-0.93)	3 mid-level	Mix of performance orientation and social goal (relatedness / affiliation)
	RRR 0.49***(C.I. 0.37-0.64)	4 high level	
11 Performance avoidance driven by interest in learning	RRR 0.00***(C.I. 0.00-0.00)	3 mid-level	Mix of mastery approach and performance avoidance
	RRR 0.18** (C.I. 0.05.0.61)	4 high level	

Predictors of Asking for help	Effects found (Conf. interval)	Level estimated (reference level 1 'very low')	Similar concepts to predictive attitude
Predictors enhancing ↑ chances of higher asking for help			
No effects found			
Predictors lowering ↓ chances of higher asking for help			
12 Interest in feeling able	RRR 0.44** (C.I. 0.20-0.99)	2 low level	Achievement seeking

** p<0.05; *** p<0.001

In the following section, general similarities and differences between the two samples are reported in order to gain further insights into the *culturally adaptive functionality* of achievement motivational attitudes with regards to self-regulatory behaviour.

6.2.3.2.4.1. Similarities and differences across countries

Within this section, the relationships between students' motivational attitudes and *planning during (order)*, *awareness of errors* and *asking for help* for both Chilean and English students are presented. In general, the results suggest that the function of motivational attitudes over self-regulatory behaviours varies across cultures, with various attitudes being relevant for self-regulation in students from one cultural context but not the other. Furthermore, some motivational attitudes (as empirically coded as well as theoretically interpreted in relation to the literature) were found to have similar as well as opposing functionalities over specific self-regulatory behaviours across cultures. Cross-country comparisons of the functionality of motivational attitudes over the target self-regulatory behaviours are reported for each of these behaviours.

The results suggest that the 'goal oriented motives' predicting *planning during (order)* tended to be different across country samples. Specifically, while attitudes indicative of performance avoidance were relevant only among Chilean students (effect n.2 and n.3, Table 6.25), collaborative attitudes and attitudes that mixed performance and mastery orientations were only important among English students (effect n.5 and n.4, Table 6.25 respectively). Moreover, 'goal oriented motives' indicative of performance approach were found to be relevant in both countries, but have opposite functionalities over *planning during (order)* across them. This approach was found to be productive for *planning* among Chileans (effect n.1, Table 6.25) but counterproductive among English students (effect n.7, Table 6.25). No other cross-cultural opposite or similar functionality of motivational attitudes over *planning during (order)* was found across samples.

Table 6.25 Summary of main effects of 'goal oriented motives' over planning during (order). Chile and England.

Predictors of Planning during (order)	Effects found (Conf. interval)	Level estimated (reference level 2 'occasional')	Similar concepts to predictive attitude
Chile - Predictors enhancing ↑ chances of higher planning during (order)			
1 Performance approach driven by an interest in feeling able	RRR 1.87** (C.I. 1.08-3.22)	4 high level	Performance approach
2 Performance avoidance driven by an interest in performing high(er)	RRR 7.41** (C.I. 2.39-22.96)	3 mid-level	Performance avoidance
Chile - Predictors lowering ↓ chances of higher planning during (order)			
3 Effortful learning avoidance driven by an interest in avoiding feeling unable	RRR 0.18** (C.I. 0.04-0.79)	3 mid-level	Fear of failure (mastery and performance avoidance)
England - Predictors enhancing ↑ chances of higher planning during (order)			
4 Performance approach driven by interest in learning	RRR 2.37** (C.I. 1.05-5.32)	3 mid-level	Mix of mastery and performance orientation
	RRR 2.78** (C.I. 1.17-6.63)	4 high level	
5 Performance approach driven by interest in helping others to learn	RRR 8.13***(C.I. 3.67-18.00)	3 mid-level	Collaborative attitude
	RRR 3.62** (C.I. 1.50-8.70)	4 high level	
6 Performance approach driven by interest in performing high(er)	RRR 1.67** (C.I. 1.19-2.33)	3 mid-level	Performance approach
	RRR 1.48** (C.I. 1.06-2.06)	4 high level	
England - Predictors lowering ↓ chances of higher planning during (order)			
7 Effortful learning approach driven by interest in performing high(er)	RRR 0.12***(C.I. 0.04-0.36)	3 mid-level	Performance approach
	RRR 0.19** (C.I. 0.06-0.63)	4 high level	

** p<0.05; *** p<0.001

In relation to *awareness of errors,* the results shown in Table 6.26 indicate that, while many goal oriented motives were relevant for *awareness of errors* among English students, only one of them was found to be relevant among Chileans. For the case of England, 'goal oriented motives' indicative of mastery approach, social goals, performance approach, as well as mixes between performance approach and social goal orientations, or performance avoidance and mastery approach, were found to relevant for *awareness of errors*. For the case of Chile, only an attitude representing mastery approach was found to be of relevance for this behaviour. Notwithstanding this general difference, there was an important similarity across samples, namely that the one 'goal oriented motive' found to be relevant among Chileans was found to have the same type of functionality (i.e. productive) over *awareness of errors* across both cultures (effect n.1 and n.2, Table 6.26). No other cross-cultural contrasts or similarities regarding the function of motivational attitudes over this self-regulatory behaviour were found.

Table 6.26 Summary of main effects of 'goal oriented motives' over awareness of errors. Chile and England.

Predictors of Awareness of errors	Effects found (Conf. interval)	Level estimated (reference level 1 'very low')	Similar concepts to predictive attitude
Chile - Predictors enhancing ↑ chances of higher awareness of errors			
1 Effortful learning approach driven by an interest in learning **(similar effect in England)**	RRR 2.33** (C.I. 1.30-4.15)	2 low level	Mastery approach
	RRR 2.78** (C.I. 1.40-5.52)	3 mid-level	
	RRR 3.76*** (C.I. 1.99-7.10)	4 high level	
Chile - Predictors lowering ↓ chances of higher awareness of errors			
No effects found			
England - Predictors enhancing ↑ chances of higher awareness of errors			
2 Effortful learning approach driven by interest in learning **(similar effect in Chile)**	RRR 2.96** (C.I. 1.58-5.56)	4 high level	Mastery approach
3 Performance approach driven by interest in performing high(er)	RRR 2.09** (C.I. 1.17-3.75)	2 low level	Performance approach
	RRR 2.28** (C.I. 1.33-3.89)	4 high level	
4 Performance avoidance driven by interest in relating to others	RRR 2.93** (C.I. 1.41-6.08)	2 low level	Relatedness / social affiliation goal
	RRR 2.00** (C.I. 1.20-3.35)	3 mid-level	
England - Predictors lowering ↓ chances of higher awareness of errors			
5 Effortful learning approach driven by interest in performing high(er)	RRR 0.14** (C.I. 0.03-0.74)	2 low level	Performance approach
	RRR 0.03***(C.I. 0.01-0.18)	3 mid-level	
	RRR 0.03***(C.I. 0.01-0.15)	4 high level	
6 Performance approach driven by interest in feeling able	RRR 0.14** (C.I. 0.02-0.87)	2 low level	Performance approach
	RRR 0.19** (C.I. 0.07-0.51)	4 high level	
7 Performance approach driven by interest in relating to others	RRR 0.61** (C.I. 0.40-0.93)	3 mid-level	Mix of performance orientation and relatedness / social affiliation goal
	RRR 0.49***(C.I. 0.37-0.64)	4 high level	
8 Performance avoidance driven by interest in learning	RRR 0.00***(C.I. 0.00-0.00)	3 mid-level	Mix of mastery approach and performance avoidance
	RRR 0.18** (C.I. 0.05.0.61)	4 high level	

** p<0.05; *** p<0.001

Finally, as can be seen in Table 6.26, no similarities nor differences were found across cultures in relation to motivational attitudes predicting *asking for help* between Chileans and English students. Nevertheless, the findings do suggest that while achievement motivational attitudes were not predictive of *asking for help* among Chileans, they were predictive for the English students. Their relevance in England was only counterproductive, however, as the negative predictive effect of the achievement motive of *feeling able* over *asking for help* indicates (effect n.1, Table 6.27).

Table 6.27 Summary of main effects of 'orientations' and 'achievement motives' over asking for help. Chile and England.

Predictors of Asking for help	**Effects found (Conf. interval)**	**Level estimated** (reference level 1 'very low')	**Similar concepts to predictive attitude**
Chile - Predictors enhancing ↑ chances of higher asking for help			
No effects found			
Chile - Predictors lowering ↓ chances of higher asking for help			
No effects found			
England - Predictors enhancing ↑ chances of higher asking for help			
No effects found			
England - Predictors lowering ↓ chances of higher asking for help			
1 Interest in feeling able	RRR 0.44** (C.I. 0.20-0.99)	2 low level	Achievement seeking

** p<0.05; *** p<0.001

A summary of all the statistically significant effects of achievement motivational attitudes over the target self-regulatory behaviours representing metacognitive control (*planning*), metacognitive monitoring (*awareness of errors*), and metacognitive control mediated by others (*asking for help*) across cultures can be found in Table 6.28.

Table 6.28 Comparison of achievement motivational attitudes predicting planning during (order), awareness of errors, and asking for help in Chile and England

	Predicted self-regulatory behaviours						
Effects of goal orientated motives	Planning during (order)		Awareness of errors		Asking for help		**Effects of orientations and achievement motives**
	Chile	England	Chile	England	Chile	England	
Parental education (in yrs)			↑↑	↑↑	↓		Parental education (in yrs)
Parental education (in yrs and quadratic form)			↓↓	↓↓	↑		Parental education (in yrs and quadratic form)
Effortful learning approach - Learning			↑↑↑	↑			Effortful learning approach
Effortful learning approach - Performing high(er)		↓↓		↓↓↓			Effortful learning avoidance
Performance approach - Learning		↑↑					Performance approach
Performance approach - Helping others to learn		↑↑					Performance avoidance
Performance approach - Performing high(er)		↑↑		↑↑			Learning
Performance approach - Feeling able	↑			↓↓			Helping others to learn
Performance approach - Relate to others				↓↓			Performing high(er)
Effortful learning avoidance - Avoiding feeling unable	↓					↓	Feeling able
Performance avoidance - Learning				↓↓			Avoiding feeling unable
Performance avoidance - Performing high(er)	↑						Relate to others
Performance avoidance - Avoiding feeling unable			(Excluded)✪				
Performance avoidance - Relate to others				↑↑			

↑↓ Each arrow indicates a statistically significant effect (p<0.005 or p<0.001) of motivational attitude on the indicated outcome variables Each motivational attitude could have enhanced/lowered the chances of arriving to higher than base levels of awareness of errors in up to 3 different degrees; *planning during (order)* in up to 2 different degrees; and *asking for help* in only one degree. The number of arrows represents the number of degrees (or contrasts between upper and base outcome variable levels) predicted by each self-regulatory behaviour within each sample and regression. The direction of the arrows represents whether the nature of the relationship was positive or negative.

✪ Performance avoidance - avoiding feeling unable was excluded from analysis due to singularity issues found in the English sample. Also excluded from Chilean sample to ensure comparability of results across samples.

As can be seen from Table 6.28, of all the specific attitudes used as predictors of self-regulation, only *effortful learning approach driven by learning* was found to have the same functionality across cultures. On the other hand, although no opposite functionalities of motivational attitudes over self-regulation were found, it is clear that different motivational attitudes predicted self-

regulatory behaviours across country samples, with many more being relevant in England than in Chile. Additionally, for the specific case of *asking for help*, it is interesting to note that, while no motivational attitude was predictive of this self-regulatory behaviour among Chilean students, the motive of *feeling able* was found to explain this behaviour in England.

Table 6.29 offers a comparison of the functionality that the different theorized social and academic goal orientations (see right hand column) represented by the 'goal oriented motives' studied (see left hand column) had for *planning during (order)* and *awareness of errors*. Highlighted effects show opposite functionalities of 'goal oriented motives' considered to represent the same goal orientations across country samples.

Table 6.29 Comparison of the function of achievement goal orientations (social and academic), represented by studied 'goal oriented motives', over planning during (order) and awareness of errors across Chile and England.

	Predicted self-regulatory behaviours				
Effects of goal orientated motives	Planning during (order)		Awareness of errors		**Interpreted social or academic goal orientation**
	Chile	England	Chile	England	
Parental education (in yrs)			↑↑	↑↑	
Parental education (in yrs and quadratic form)			↓↓	↓↓	
Effortful learning approach - Learning			↑↑↑	↑	Mastery approach
Effortful learning approach - Performing high(er)		↓↓		↓↓↓	Performance approach
Performance approach - Learning		↑↑			Mix of mastery and performance orientation
Performance approach - Helping others to learn		↑↑			Collaborative attitude
Performance approach - Performing high(er)		↑↑		↑↑	Performance approach
Performance approach - Feeling able	↑			↓↓	Performance approach
Performance approach - Relate to others				↓↓	Mix of performance orientation and relatedness / social affiliation goal
Effortful learning avoidance - Avoiding feeling unable	↓				Fear of failure (mastery and performance avoidance)
Performance avoidance - Learning				↓↓	Mix of mastery approach and performance avoidance
Performance avoidance - Performing high(er)	↑				Performance avoidance
Performance avoidance - Avoiding feeling unable			(Excluded)✪		Performance avoidance
Performance avoidance - Relate to others				↑↑	Relatedness / social affiliation goal

↑↓ Each arrow indicates a statistically significant effect ($p<0.005$ or $p<0.001$) of motivational attitude on the indicated outcome variables Each motivational attitude could have enhanced/lowered the chances of arriving to higher than base levels of *awareness of errors* in up to 3 different degrees and *planning during (order)* in up to 2 different degrees. The number of arrows represents the number of degrees (or contrasts between upper and base outcome variable levels) predicted by each self-regulatory behaviour within each sample and regression. The direction of the arrows represents whether the nature of the relationship was positive or negative.

✪ Performance avoidance - avoiding feeling unable was excluded from analysis due to singularity issues found in the English sample. Also excluded from Chilean sample to ensure comparability of results across samples.

As can be found in Table 6.29, at a theoretical level, the only culturally differential functionality of motivational attitudes over self-regulation that emerged, was the opposite functionality of performance approach over *planning during (order)* across samples. Specifically, while performance approach (i.e. showing performance to feel able) was productive for *planning* among Chileans, it (i.e. investing effort to outperform others) was found to be counterproductive among English students. In other words, a more self-referenced type of performance approach was productive within Chile and a more socially-referenced type of performance approach was counterproductive for *planning* (but also *awareness of errors*) among English students.

In general, and based upon the equivalences previously suggested in Table 6.9 a mastery approach was found to be productive for self-regulation in both country samples; a performance approach was found to be productive for self-regulation in Chile, but had an inconsistent predictive effect in England; and performance avoidance was found to be productive for self-regulation only in Chile. Other types of attitudes closely related to achievement goal orientations were also found to have a predictive effect on self-regulation among students. In particular, fear of failure (*effortful learning avoidance driven by avoiding feeling unable*) had a negative predictive effect on self-regulation only in Chile; an attitude indicating students' need for competence (interest in *feeling able*) predicted lower levels of dependency-oriented help-seeking (*asking for help*) only in England; a collaborative attitude (*performance approach driven by helping others*) had a positive predictive effect on self-regulation only in England. Finally, some attitudes mixing different types of achievement goal orientations also had some predictive functions over self-regulation. However, their mixed nature makes them too unspecific to understand their cultural underpinnings, and they therefore will not be discussed here. These were the negative effect of an attitude mixing performance avoidance and mastery approach[43] (*performance avoidance driven by learning*), and the positive effect of an attitude mixing performance approach and mastery approach[44] (*performance approach driven by learning*), both within England.

6.2.4. Conclusions

This chapter explored the role that culture had over achievement motivational attitudes adoption, and the functionality of these attitudes for self-regulation, and effort required for self-regulation. In general, the results provide evidence suggesting that culture does have an important role over all these aspects. Findings provided some preliminary support for the thesis regarding the *culturally adaptive functionality* of motivational attitudes underlying self-regulation. The specific conclusions drawn from each research question explored in this chapter are presented, and then some overall concluding remarks are offered.

6.2.5. Research question 4 conclusion

In conclusion, it is possible to give an affirmative answer to research question 4. There were differences between Chilean and English students in the achievement motivational attitudes

[43] This effect might be due to the inclusion of contradicting goals within one and the same attitude. Therefore, its negative effect might be better explained by the extent to which it requires children to divide their resources for self-regulation towards incompatible aims. As this does not related to culture, this effect is not discussed within the main text.

[44] This effect simply reflects the combined positive effects of performance approach and mastery approach, two attitudes that have been regarded to be positively related to self-regulation in general.

they tend to adopt. It is important to point out, however, that these differences were found in the minority of the motivational attitudes explored. The results suggest that English students had a more positive attitude towards effort investment than Chilean students. Furthermore, some goal oriented motives which could be argued to be indicative of a performance approach (*effortful learning driven by performing high(er)*) and a mix between mastery approach and performance avoidance (*performance avoidance driven by learning*) were adopted more by Chilean than English students.

6.2.6. Research question 5 conclusion

From the evidence gathered to answer this research question it is possible to conclude that achievement motivational attitudes predicting *effort* differed to great extent across country samples. In relation to the functionality of 'goal oriented motives' over *effort* across cultures, it is possible to conclude that:

- A much wider variety of 'goal oriented motives' predicted *effort* in English than in Chilean students.
- Performance approach orientation driven by a self-referenced motivation, such as feeling able, was found to be the only motivational attitude to predict *effort*, among Chilean students, having a negative function for them.
- Surprisingly, performance approach and fear of failure had a positive function over *effort* among English students. The functionality of performance approach, however, turned negative when high levels of *effort* were predicted.
- Performance approach changed its function over *effort* among English students according to the meaning they gave to the demonstration of performance. When demonstration of performance was given a clear performance meaning (outperforming others), it took on a positive function over *effort*. But this function turned negative when students gave it a mastery (learning) or pro-social meaning (relating to others).
- When predicting high levels of *effort*, performance approach took the same negative functionality across cultures. Its function became opposite across cultures when mid-levels of *effort* were predicted, however, turning positive in England and staying negative in Chile.

6.2.7. Research question 6 conclusion

The results presented in relation to this research question lead to the conclusion that the role of achievement motivational attitudes in self-regulatory behaviours does vary to important degrees between Chilean and English 8 to 9 year-olds. Many more achievement motivational attitudes predicted self-regulation in England than in Chile. Also, while motivational attitudes

were predictive of all three self-regulatory behaviours in England, they were not found to be predictive of *asking for help*, indicative of assisted self-regulation, among Chileans. Moreover, different attitudes predicted self-regulatory behaviours within each culture. When considering the psychological constructs that students' answers and behaviours were interpreted to represent, it is possible to establish that:

- In Chile, mastery approach and performance approach were found to be productive for *awareness of errors* and *planning during*, respectively. Also, performance avoidance was found to have a productive functionality over *planning during* in this country sample.
- In England, while mastery approach and social orientation were found to be productive for *awareness of errors*, collaborative (learning) attitude was productive for *planning during*. Furthermore, performance approach had inconsistent effects on self-regulation among English students. Some goal oriented motives representing performance approach had positive effects on *awareness of* errors, while others had a negative effect. Specifically, various attitudes representing performance orientations (approach, avoidance, or mixed with social goals) were found to be counterproductive for this behaviour. Performance approach was also found to be productive and counterproductive for *planning during*. Finally, an interest in *feeling able* was also found to be counterproductive for engaging in assisted self-regulation.

Additionally, in terms of the similarities and opposing functionalities of motivational attitudes over self-regulation across cultures it is possible to say that:

- Mastery approach was the only type of orientation found to have a similar functionality for self-regulation across cultures, making *awareness of errors* more likely in both Chilean and English students.
- Performance approach was the only type of orientation found to have opposite functionalities for self-regulation across cultures, having a productive functionality over *planning during* in Chile, but a counterproductive functionality over both *planning during* and *awareness of errors* in England. It is important to bear in mind, however, that this attitude was inconsistent within England, so this opposite function should be interpreted with caution.

The results provide some initial but very relevant support to a theory of *culturally adaptive functionality* of motivational beliefs for self-regulation. In particular, they suggest that the very same self-regulatory behaviours tend to be supported by different achievement motivational attitudes across cultures. Motivational attitudes representing the same goal orientation were also found to have opposite functionalities over self-regulation across cultures, making it more likely in one culture but less likely in the other. Notwithstanding, there also were some

similarities between the country samples that point to the need to keep probing a theory regarding certain core universal motivational attitudes for self-regulation.

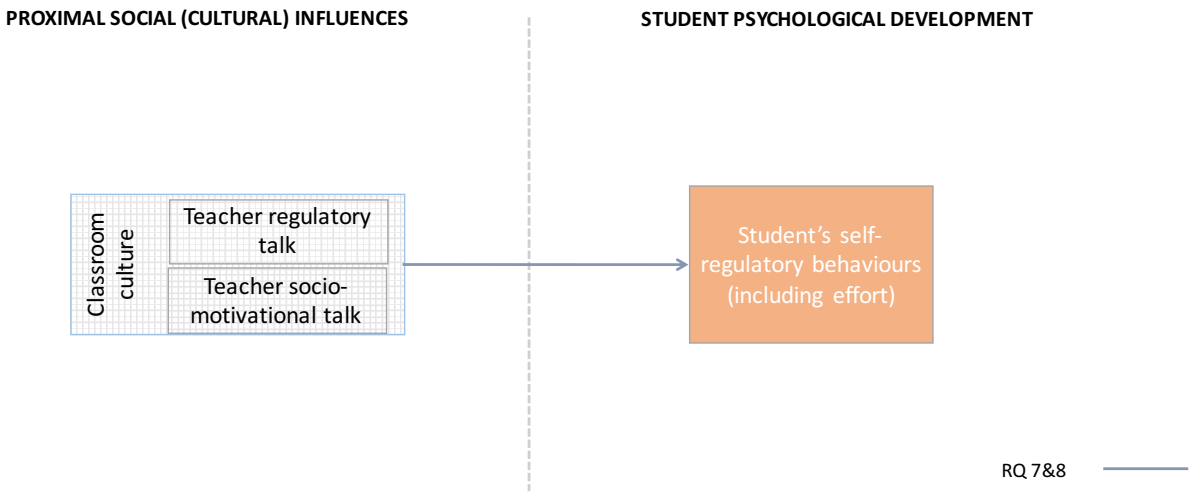
Considering the research questions addressed in this chapter all together, there are four key ideas that can be concluded. First, the extent to which children adopted particular achievement motivational attitudes varied across country samples (see Sections 6.2.1.1 to 6.2.1.3). Second, a wider variety of motivational attitudes predicted *effort* and self-regulatory behaviours among English than Chileans students. This was accentuated in the prediction of *effort* and *asking for help*, for which one and no motivational attitudes were found to be relevant among Chileans, respectively. Third, the function of motivational attitudes over self-regulatory behaviours was also found to be culture-specific. The same self-regulatory behaviours tended to be supported or undercut by different motivational attitudes across cultures. Moreover, some attitudes representing the same goal orientation were found to have opposite functionalities over self-regulatory behaviours across country samples (see Section 6.2.3.2.4.1). Fourth and finally, only one cultural similarity was found in the function of motivational attitudes over the outcomes explored. Namely, motivational attitudes indicative of mastery approach had a positive effect over metacognitive monitoring (*awareness of errors*) in both country samples.

In general, the results provide evidence supporting the idea that – although there are some important differences in terms of the level to which motivational attitudes are adopted in different countries – the strongest cultural differences are in the function that motivational attitudes have for effort and other self-regulatory behaviours. More about why this might be the case is discussed in Chapter 8. The next chapter zooms in to the relevance that classroom cultures might have for students' self-regulatory behaviours. Given that the chapter will look at how both cognitive and motivational features of classrooms predict children's self-regulation, it could also help to illuminate theorisations as to why motivational attitudes are adopted to different degrees and take culture-specific functions.

7. Findings III. Classroom cultures and student self-regulation: The role of teacher talk

Previous chapters addressed the role of national cultures in the development of self-regulation and adoption of achievement motivational attitudes relevant for self-regulation. Among some of the most revealing findings were the cultural variations in the characteristics of latent self-regulatory processes; the culture-specificity of the predictive (pragmatic) functionalities that achievement motivational attitudes had over effort and self-regulatory behaviours; and the culture-specificity of the predictive (pragmatic) functionality that these behaviours had over task achievement. Taken together, the results support the conclusion that both the way in which children's self-regulation is implemented as well as the adoption and function of achievement motivational attitudes relevant for self-regulation could depend to a great extent on the cultural context in which children grow up. The findings presented so far, however, do not allow for determining the specific origins of such cultural influence. As part of an attempt to address this issue, the present chapter explores the importance that education cultures might have for children's self-regulation. A general overview of the different types of variables involved in this chapter and the relationships explored can be seen in Figure 7.1

Figure 7.1 Summary of relationships explored between classroom culture and self-regulation



As can be seen from Figure 7.1, to carry out an enquiry into the importance of education cultures for children's self-regulation, the relationship between classroom education cultures and students' self-regulation was studied. Given the abundant literature that draws conclusions regarding the importance of cognitive and socio-emotional quality of social interactions (communication) for learning for the development of self-regulation (Section 2.2 and 2.5.2), education cultures were explored by studying the quality of teacher-student communication in

Chilean and English classrooms. In particular, as has already been mentioned (Section 4.1.3), the role that teachers' 'regulatory talk' and 'socio-motivational talk' – which generate and sustain classroom cultures – had on children's self-regulatory behaviours was explored. The research questions guiding the enquiries of this chapter are:

R.Q.7. *What is the relevance of classrooms, and the cognitive culture sustained within them by teachers through 'regulatory talk', for students' self-regulatory behaviours?*

R.Q.8. *What is the relevance of classroom motivation culture sustained by teachers through 'socio-motivational talk' for students' self-regulatory behaviours?*

If a relationship were to be established between classroom cultural communication patterns and students' self-regulation, the specific nature of the findings would provide important clues about the mechanisms through which schooling might influence cognitive development. For instance, if teachers' *guidance talk* (i.e. teacher talk engaging students in joint inter-mental thinking about their own learning activity/performance) were found to promote higher levels of student self-regulatory behaviour, the theory of *internalization* of communicative patterns as individual cognitive processes would gain support (in keeping with a Vygotskian perspective). On the other hand, if teachers' *directive talk* (e.g., telling students what to do) or *self-regulatory talk* (e.g., asking students to evaluate their own learning products) were found to promote higher levels of self-regulation, for example by promoting students *asking for clarifications*, a theory of *social affordance* of cognition through communicative demands (a more anthropological perspective) could be considered more adequate.

At this point, it seems relevant to remind the reader that the Vygotskian internalization theory has generally been supported when looking at effects of systematic communicative patterns over human cognition (Section 2.2.5). The theory has not been explored, however, through the effects of unsystematic or diffused inter-mental activity commonly found in the naturalistic classroom over cognition, at least in regards to self-regulation. Therefore, if an internalization theory were to be supported, the findings could help to expand the scope of the applicability of the Vygotskian internalization theory of human psychological development (Vygotsky, 1978). If, on the other hand, a theory of social affordance of human development were to be a better way to understand the findings, the results would suggest the importance of deepening the use of anthropological theory and methods to study the links between everyday schooling and human cognitive development.

Multilevel statistical techniques, deemed to be more adequate for exploring the importance of group (such as classroom) level variables over individual level variables (such as self-regulation), were considered to be the most appropriate to answer the research questions. Due to the limited statistical power provided by the low number of classroom samples included in this study per country (four classrooms per country), and the focus on teacher-student

interaction of this chapter's enquiries, Chilean and English classrooms had to be pooled together to conduct a multilevel analysis.[45] This improved the variability of the data, allowing a more consistent estimation of the influence that classrooms, and teacher talk within them, had over students' self-regulation, as well as enhanced statistical power by including more groups to the analysis. Clearly, a separate analysis of the importance of classroom and teaching-learning interactions per country would have been more informative for understanding the culture-specific functions found in previous findings chapters. However, the pooling of all classrooms within single analyses do allow for aiding understanding of the *culturally adaptive functionality* of self-regulation at the level of classroom cultures. The pooling also provided a higher representation of the diversity of teacher-student interactions that it was possible to find within different classroom cultures and approaches to schooling in general.

The chapter is divided in four sections. The first section includes information about the variables considered within the chapter, what they represent, and their descriptive statistics. In the two subsequent sections, each research question is addressed in turn. Summaries of findings and generic conclusions in relation to how results relate to theories of internalization and social affordance, as well as to the general argument of the *culturally adaptive functionality* of students' self-regulation developed throughout this thesis, are provided at the end of the chapter.

7.1. Data information and descriptives

Three different types of data sets were used to answer the research questions in this chapter. It is worth reminding the reader here what the different variables reported in this chapter represent. First, 'self-regulation' variables represent the level to which students were observed to display self-regulatory behaviours while carrying out the series of cube assembly tasks used in this study. Second, teacher 'regulatory talk' represents a variety of communicative patterns through which teachers regulated students' thinking and learning activity (i.e. through directions, guidance, or self-regulatory demands). Finally, teacher 'socio-motivational talk' represents a variety of messages through which teachers communicated educational values (i.e. the value of learning process, performance, or the importance of collaboration for learning), and built a learning climate that was either supportive or threatening for students' sense of competence. All are aspects which could be considered relevant for children and students' adoption of achievement goal orientations (Section 2.5.1) and development of self-regulation (Section 2.5.2). Both types of teacher talk were analysed as observed when teachers talked to the whole classroom, small groups, or individual students (either publicly or privately), in a

[45] These techniques generally need a minimum of 10 groups, ideally 30, to be able correctly estimate group effects over characteristics of group members.

series of literacy lesson filmed towards the end of the school year and under naturalistic conditions in the participating classrooms.

.

Table 7.1 shows means and standard deviations of self-regulatory behaviours, for each group of students sampled per classroom. Following the high variety of socio-economic backgrounds represented by the schools included in this study, and the relevance that *parental education* has proved to have in findings regarding student educational achievement (Hannon, 2015), information in Table 7.1 has been ordered following this criterion to facilitate examination. Classrooms including students from higher educated families are shown towards the right side of the table (for more information about SES of participating schools and level of education of the parents of the participating students see sampling in Section 3.3).

Table 7.1 Summary of descriptives of self-regulatory behaviours across participating classrooms

Self-regulatory behaviour	Chile		Chile		Chile		England		Chile		England		England		England	
	CH1 class		CH2 class		CH3 class		EN1 class		CH4 class		EN2 class		EN3 class		EN4 class	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Planning before	2.97	*0.829*	2.93	*0.84*	3.00	*0.82*	3.01	*0.85*	2.83	*0.86*	3.14	*0.89*	2.87	*0.82*	2.73	*0.82*
Planning during (order)	3.17	*0.802*	3.35	*0.85*	3.40	*0.83*	3.48	*0.81*	3.43	*0.82*	3.36	*0.92*	3.29	*0.85*	3.64	*0.63*
Effective control of problems	3.14	*0.96*	3.18	*1.16*	3.40	*0.87*	3.61	*0.73*	3.22	*1.04*	3.29	*1.06*	3.30	*1.12*	3.74	*0.68*
Learning from errors	2.16	*0.785*	2.37	*0.90*	2.24	*0.90*	2.24	*0.79*	2.32	*0.69*	2.16	*0.91*	2.12	*0.82*	2.31	*0.87*
Use of building strategies	1.62	*0.678*	1.53	*0.70*	1.76	*0.70*	1.69	*0.70*	1.58	*0.60*	1.43	*0.65*	1.62	*0.68*	1.57	*0.70*
Use of model	3.05	*0.856*	3.04	*0.83*	3.11	*0.93*	3.33	*0.74*	3.36	*0.81*	2.90	*0.89*	3.26	*0.89*	3.13	*0.82*
Monitoring	2.94	*0.882*	2.73	*1.14*	2.92	*0.95*	2.68	*1.02*	2.87	*0.94*	2.90	*1.10*	2.91	*0.97*	2.82	*1.01*
Awareness of errors	3.02	*1.127*	2.57	*1.26*	3.12	*1.04*	3.02	*1.06*	2.92	*1.11*	3.35	*1.08*	2.92	*1.20*	3.52	*0.83*
Evaluation	2.26	*1.079*	1.91	*0.85*	2.35	*0.98*	2.15	*0.94*	2.47	*1.14*	2.39	*1.05*	2.09	*1.06*	2.38	*1.11*
Concentration	3.91	*0.341*	3.99	*0.12*	3.98	*0.15*	3.91	*0.29*	3.99	*0.12*	3.90	*0.38*	3.96	*0.21*	3.96	*0.20*
Maintain motivation	4.00	*0.00*	3.68	*0.83*	3.99	*0.11*	3.89	*0.45*	3.97	*0.16*	3.79	*0.65*	3.99	*0.11*	3.99	*0.11*
Effort	1.83	*1.039*	1.49	*0.91*	1.98	*1.06*	1.59	*0.77*	1.57	*0.97*	2.10	*1.05*	1.84	*0.90*	1.45	*0.80*
Asking for help	1.12	*0.331*	1.09	*0.29*	1.05	*0.21*	1.09	*0.29*	1.26	*0.57*	1.07	*0.31*	1.03	*0.23*	1.10	*0.35*
Asking for clarifications	0.12	*0.375*	0.05	*0.36*	0.05	*0.26*	0.01	*0.12*	0.14	*0.39*	0.22	*0.51*	0.20	*0.45*	0.09	*0.29*

Table 7.2 shows means and standard deviations for levels of performance and challenge faced observed across students by classroom. Classrooms are again ordered according to levels of parental education. Classrooms with higher levels of parental education are presented towards the right.

Table 7.2 Summary of descriptives of task achievement and challenge across participating classrooms

Country	Chile		Chile		Chile		England		Chile		England		England		England	
	CH1 class		CH2 class		CH3 class		EN1 class		CH4 class		EN2 class		EN3 class		EN4 class	
Indicators	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Final task accuracy	3.28	1.07	3.04	1.19	3.41	0.98	3.23	1.18	3.18	1.19	3.42	1.06	3.19	1.12	3.82	0.56
Level of challenge	2.68	0.81	2.39	0.88	2.59	0.78	2.80	0.82	2.53	0.87	2.67	1.01	2.79	0.72	2.58	0.88

These analyses of self-regulatory behaviours at the classroom level show that there is a good level of variability in the different variables examined, both within and between classrooms.

There were, however, a few of these measures demonstrating either a floor or ceiling effect. *Asking for clarifications* showed a floor effect as it only ranged from 0.01 to 0.22 classroom averages on a 0 to 3 range, and the case of *asking for help* was similar, ranging from 1.03 to 1.26 averages on a 1 to 4 scale. At the other end, *maintaining motivation* and *concentration* showed ceiling effects as they ranged from 3.68 to 4.00 and 3.91 to 3.99 averages on 1 to 4 scales, respectively. These behaviours will still be considered for analysis, but monitored in case they generate any problems with statistical computations. Classroom standard deviations were considered adequate for 4-point scales, as they ranged from 0.11 to 1.26 across all measures (the only exception being the SD of *maintaining motivation* in classroom CH1, found to be zero).

Table 7.3 and Table 7.4 show the percentage of teacher talk considered as 'regulatory talk' by classroom. In Table 7.3, classrooms are ordered by country of origin and then from top to bottom according to levels of parental education. Classrooms with higher levels of parental education are placed towards the bottom of each country section.

Table 7.3 Percentage of teacher 'regulatory talk' across participating classrooms

Classroom	Self-regulatory talk	Guiding talk	Directive talk	Overall - Regulatory talk
EN1	2.3	15.4	5.4	23.1
EN2	9.7	25.2	10.5	45.4
EN3	1.2	11.4	11.7	24.3
EN4	2.4	12.5	12.0	26.9
CH1	4.4	19.5	6.5	30.4
CH2	5.0	13.3	7.0	25.3
CH3	3.5	8.9	10.1	22.5
CH4	2.4	7.1	11.4	20.9

Table 7.4 shows the average percentage of the different types of 'regulatory talk' by country sample.

Table 7.4 Percentage of teacher 'regulatory talk' per country sample

Country	Self-regulatory talk	Guiding talk	Directive talk	Overall - Regulatory talk
England	3.9	16.1	9.9	29.9
Chile	3.8	12.2	8.8	24.8

Teacher 'regulatory talk', and all its types, were shown to be present to varied levels across participating classrooms. *Self-regulatory talk* ranged from 1.2 to 9.7 per cent across classrooms, *guiding talk* from 7.1 to 25.2 per cent across classrooms, and *directive talk* from 5.4 to 12 per cent across classrooms. This was also considered to be an adequate level of variability for subsequent classroom level analyses.

Table 7.5 and Table 7.6 show the percentage of teacher talk considered as 'socio-motivational talk' by classroom and country sample. In Table 7.5 classrooms are ordered by country of origin and then from top to bottom according to parental education, with higher levels of parental education towards the bottom of each country section.

Table 7.5 Percentage of 'socio-motivational talk' over total of teachers' speech turns across participating classrooms

Country	Classroom	Talk for mastery	Talk for performance	Talk for self-efficacy	Talk against self-efficacy	Talk for collaboration	Overall socio-motivational talk
England	EN1	10.17	5.03	13.33	0.20	1.18	29.91
	EN2	19.34	2.32	11.80	0.39	8.51	42.36
	EN3	6.30	7.53	4.55	1.05	3.33	22.76
	EN4	5.16	9.83	4.91	1.23	0.74	21.87
Chile	CH1	10.97	3.82	8.74	0.95	0.16	24.64
	CH2	9.05	1.99	6.29	0.15	0.00	17.48
	CH3	7.80	4.15	3.90	0.00	0.00	15.85
	CH4	4.21	7.66	3.83	3.07	0.19	18.96

Table 7.6 Percentage of teacher 'socio-motivational talk' over total of speech turns per country sample

Country	Talk for mastery	Talk for performance	Talk for self-efficacy	Talk against self-efficacy	Talk for collaboration	Overall socio-motivational talk
England	10.24	6.18	8.65	0.72	3.44	29.23
Chile	8.01	4.40	5.69	1.04	0.09	19.23

As can be seen from the tables above, teacher 'socio-motivational talk', and all its different subtypes, showed to be present to varied levels across participating classrooms and country levels. The only subtypes of this teacher talk not found to be present across all classrooms were *talk against self-efficacy* (present in 7 out of 8 classrooms) and *talk for collaboration* (present in 6 out of 8 classrooms). They all, however, were present to some degree in either country sample. The absence of these two specific types of teacher talk in only a few classrooms was considered to be good for a maximization of the variability required to test the predictive power of classrooms on students' self-regulation. Before the presentation of the results of this enquiry, a brief note in relation to the statistical technique applied is offered.

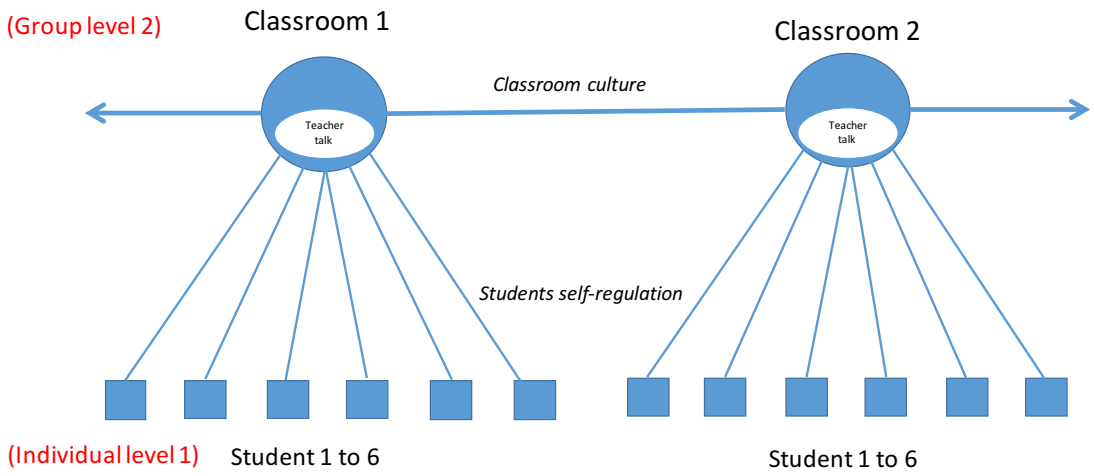
7.1.1. Preliminary note on the analysis carried out

Multilevel modelling techniques were applied to determine the relevance that classrooms and teacher 'regulatory talk' as well as 'socio-motivational talk' had on students' self-regulation. These techniques allowed for determination of the extent to which any two students sampled from the same classroom group were similar to one another, and at the same time different from

students from other classrooms (Hox, 2010), with respect to self-regulation. Moreover, they also allowed for testing of whether these within-classroom similarities could be considered to be due to specific characteristics of the families of the students, such as parental education, or characteristics of the classroom, such as teacher-student communication.

Usually the sample size to test a multilevel model is considered to be better with 30 groups or more (Snijders, 2005). Nevertheless, according to Leonidas Kyriakides (personal communication, March 10, 2016) there is no hard rule in terms of the minimum number of groups required to conduct this type of modelling. More groups simply provide higher statistical power to avoid not findings effect where there might actually be one (type II error). Therefore, the only requirement to justify the use of this type of technique is to find enough variance of the variable of interest to depend on the 'grouping' of participants, so the power of explanatory variables to account for this group effect can be tested. Other data assumptions are generally not checked in this type of analysis even when looking at the effects of instruction over students' outcomes (Bottge et al., 2015; Frenzel et al., 2007; Trobst et al., 2016), but a report regarding the extent to which some assumptions of the analyses conducted were met can be found in Appendix 5.5. The two-level model explored here is depicted in Figure 7.2.

Figure 7.2 Multilevel analysis model – Classroom teacher talk and student self-regulation



7.2. Results

This section presents the results of the statistical tests applied in order to answer the two research questions explored in this chapter.

7.2.1. RQ7. What is the relevance of classrooms, and the cognitive culture sustained within them by teachers through 'regulatory talk', for students' self-regulatory behaviours?

The analyses carried out to answer this research question aimed to determine the extent to which classrooms could be considered to explain children's self-regulation. If classrooms could be considered to explain children's self-regulation, then the question also sets out to examine whether or not, and how, teacher 'regulatory talk' could be considered to account for such an influence. In the following sections, the importance of classrooms for self-regulation is analysed first. Then the extent to which teachers 'regulatory talk' was found to account for the classroom effect on student self-regulation is presented.

7.2.1.1. Importance of the classroom in students' self-regulatory behaviours

Two types of analysis were carried out. The first was an analysis of the importance of classrooms in students' self-regulation before considering the levels of education of students' parents. This type of analysis was conducted under two conditions. The first was considering the importance of classrooms in self-regulation observed when students approached tasks representing a wide variety of levels of challenge for them ('all tasks condition'). The second was considering only those tasks that posed an appropriate and high level of challenge for students (i.e. 'more challenging tasks condition'). The interest in this second condition arises from research suggesting that self-regulation can be observed more clearly when children face challenging tasks (Perry and Winne, 2013).

The level of challenge a task posed for students was judged individually for each student when they engaged with each cube assembly task. The explanatory models of student self-regulation under all task conditions and more challenging task conditions (see Table 7.7) were calculated over the 49 student cases. Students' average scores for each self-regulatory behaviour under each of the two challenge conditions were used as data. A Generalized Least Squares method, considered to be more appropriate when modelling the effect of groups before considering the effect of any other explanatory variable (Hox, 2010), was applied in this first step.

Table 7.7 Two explored task conditions

All tasks - condition 1	More challenging tasks - condition 2
Includes all the 11 to 13 tasks carried out by students. From low to high levels of challenge.	Tasks of appropriate level of challenge for each student.
	Tasks of a high level of challenge for each student.

Table 7.8 shows the intraclass correlation (ICC) which may be interpreted here as the degree to which any two students from the same classroom group were similar to each other as opposed to students from other researched classrooms. Individual variables for which their variance (ICC) was explained by the classroom level in 5% or more were considered to be of interest for this study. This cut-off point was adopted considering that previous educational research has found group effects to have effect sizes of around .10 to .15 over educational outcomes (Marks, 2015; Scheerens, Witziers, & Steen, 2013). If we consider the approximate equivalence of 1%, 9% and 25% ICCs, to effect sizes of .10 (small), .30 (medium) and .50 (large) (Hox, 2010), then 5% could be considered to be a small to medium size effect worth exploring.

Table 7.8 Variance of self-regulatory behaviours explained by classrooms

Self-regulatory behaviour	Intraclass correlation - All tasks (condition 1)	Intraclass correlation - Challenging tasks (condition 2)
Planning before	0.0%	**9.2%***
Planning during (order)	0.7%	**7.6%***
Effective control of problems	0.0%	3.9%
Learning from errors	0.0%	0.0%
Use of building strategies	3.0%	0.0%
Use of model	**7.8%***	0.0%
Monitoring	0.0%	0.0%
Awareness of errors	0.0%	0.0%
Evaluation	0.0%	1.5%
Asking for clarifications	**8.1%***	**7.1%***
Asking for help	**10.1%***	**14.7%***
Concentration	0.0%	0.0%
Maintaining motivation	0.0%	**8.9%***
Effort	**19.0%***	**33.5%***

*ICC of 5% or more.

The results from the multilevel empty/unconditional model analyses (without no explanatory variable other than classroom clustering) showed interesting results despite the low power given by a small number of classroom groups. ICC levels indicated relevant effects of classrooms on self-regulatory behaviours ranging from 0.7% to 33.5%. There were some particular behaviours found to be more sensitive to classroom effects than others. When considering all tasks, the self-regulatory behaviours found to vary according to classroom in 5% or more were *use of model* (7.8%), *asking for clarifications* (8.1%), *asking for help* (10.1%), and *effort* (19%).

On the other hand, when considering more challenging tasks, the percentage of variance of self-regulatory behaviours explained by the classroom changed strongly. For some aspects, such as *use of model*, the classroom effect completely disappeared, while for the large majority it rose. There is also a higher differentiation between classrooms with respect to *planning before* (9.2%), *planning during (order)* (7.6%) and *maintaining motivation* (8.9%) when considering

more challenging tasks. These classroom effects were not visible when considering all tasks. Other student behaviours which also showed high levels of variance explained by classroom of origin in more challenging tasks were *asking for clarifications* (7.1%) and *asking for help* (14.7%). *Effort* was the most noticeable of them, an was explained by 33.5% (in comparison to a previous 19%) by the classroom level.

Other self-regulatory behaviours worth mentioning are those that, in spite of not making the 5% mark, showed at least a level of effect equivalent to a small effect size (ICC 1%). These were: *use of building strategies* (3% under all task conditions), *effective control of problems* (3.9% under more challenging task conditions), and *evaluation* (1.5%, under more challenging task conditions). Finally, among those students' behaviours not found to vary according to classroom of origin were *monitoring*, *awareness of errors, learning from errors*, and *concentration*.

Table 7.9 shows the importance of the classroom for those self-regulatory behaviours previously reported to be of interest (when looking at more challenging conditions), but this time using Maximum Likelihood method (a method that will need to be used when adding explanatory and control variables to the model). Although slightly more conservative, the results are similar to those found using the GLS method reported above in Table 7.8 (please note that while in the previous table ICCs were expressed in terms of percentages, in the following tables they are expressed as a range of 0 to 1).

Table 7.9 Multilevel analysis. Importance of classrooms for self-regulation (using ML method).

Self-regulatory behaviour	All tasks			More challenging tasks		
	Variance		ICC	Variance		ICC
	Between classroom	Within classroom		Between classroom	Within classroom	
Planning before	0.000	0.100	0.0000	0.009	0.132	**0.0624**
Planning during (order)	0.000	0.090	0.0000	0.008	0.188	**0.0429**
Asking for clarifications	0.001	0.020	**0.0589**	0.001	0.033	**0.0411**
Asking for help	0.001	0.019	**0.0736**	0.005	0.039	**0.1146**
Maintaining motivation	0.000	0.100	0.0000	0.004	0.060	**0.0581**
Effort	0.027	0.149	**0.1526**	0.112	0.270	**0.2927**

In bold: Behaviours that show some level of classroom dependance before controlling for levels of parental education

7.2.1.2. Importance of the classroom in students' self-regulation after considering parental education

As mentioned previously, the participating students came from a wide variety of socio economic backgrounds and families with diverse levels of education. Some parents of the participating students reached only 9 years of schooling, whereas others obtained PhDs. It therefore seemed

necessary to include this information to see if its consideration explained the effect that was possible to observe from the classroom. This was particularly relevant in this study as Chilean schools are known to be highly segregated according to socio-economic status (Valenzuela, Belleï, & de los Ríos, 2013), and private (also known as public or independent) schools in England are known to work with families from the elite (Jenkins et al., 2008).

Table 7.10 shows the results from a linear regression within a multilevel environment, this time applying a Maximum Likelihood Method found to be more precise when including explanatory variables to the multilevel model regression (Hox, 2010). Here, parental education was used as a predictor of self-regulation across classrooms. Given previously documented quadratic effects of parental education over measures of student educational outcomes (Dickson et al., 2014), both raw and squared versions of parental education (in years) were entered simultaneously as regressors of self-regulatory behaviours. Following the clear higher importance of classrooms over student activity in 'more challenging tasks' (a condition more akin to problem solving), only this condition has been considered for the subsequent analyses.

Table 7.10 Importance of classrooms in student self-regulation after controlling for parental education (more challenging tasks condition)

Self-regulatory behaviour	Parents' years of education		Parents' years of education (squared)		Variance		ICC
	B coef.	p value	B coef.	p value	Between classroom	Within classroom	
Planning before	0.043	0.756	-0.001	0.741	0.008	0.133	**0.0571**
Planning during (order)	0.125	0.421	-0.002	0.642	0.000	0.171	0.0000
Asking for clarifications	-0.024	0.724	0.001	0.646	0.001	0.033	**0.0203**
Asking for help	0.679	0.369	-0.022	0.355	0.004	0.039	**0.0945**
Maintaining motivation	-0.108	0.240	0.004	0.207	0.006	0.056	**0.1009**
Effort	0.339	0.087	0.010	0.111	0.101	0.254	**0.2837**

In bold: Behaviours that show some level of classroom dependance after controlling for levels of parental education

Table 7.11 below shows a summary of the extent to which self-regulatory behaviours, observed in children when engaged in tasks that were challenging for them, varied as a function of 'classroom effects' (belonging to a particular classroom) and 'family effects' (parental education).

Table 7.11 Summary of importance of classrooms in student self-regulation before and after controlling for parental education (more challenging tasks condition)

Self-regulatory behaviour	ICC **before** controlling for parental education	ICC **after** controlling for parental education
Planning before	0.0624	0.0571
Planning during (order)	0.0429	0.0000
Asking for clarifications	0.0411	0.0203
Asking for help	0.1146	0.0945
Maintaining motivation	0.0581	0.1009
Effort	0.2927	0.2837

As can be observed in Table 7.11 above, parental education explained all the classroom variance found for *planning during*, and over half of the classroom variance found for *asking for clarifications*. In general, however, classrooms maintained similar levels of influence or were even found to have higher levels of influence over self-regulation once the importance of parental education over self-regulation was considered. Specifically, *planning before* (5.71%), *asking for clarifications* (2,03%), *asking for help* (9.45%), *maintaining motivation* (10.09%), and most noticeable *effort* (28.37%), showed levels of classroom influence after controlling for parental education. The results suggest that after considering parental education, social aspects (asking questions), motivational aspects (engaging and persisting) and cognitive aspects (planning) of self-regulation could be considered to be influenced by classrooms.

7.2.1.3. Summary

Results showed that classrooms were important for student self-regulation. The importance of classrooms was stronger when students faced 'more challenging tasks'. Among those behaviours found to vary according to classroom after controlling for parental education were those representing 'social', 'motivational' and 'cognitive' dimensions of self-regulation. These were: *Asking for help* and *asking for clarification* (social), *effort* and *maintaining motivation* (motivational), as well as *planning* (cognitive). Specifically, the effect on the two 'social' and the one 'cognitive' behavioural indicators were found to be equivalent to small to middle effect sizes (2% to 9% ICCs), whereas the two behavioural indicators of the motivational dimension of self-regulation were found to vary to a level between middle and strong effect size (10% to 28% ICCs). It is important to consider, however, that aspects of the classroom culture explaining this 'classroom effect' on students' self-regulation could be varied. They could be characteristics of the classroom, such as teacher-student communications, student peer effects, or even school effects (as only one classroom was included per school). In order to establish if the classroom effect found here could be attributed to teacher-student communications, the importance of

teachers' 'regulatory talk' and 'socio-motivational talk' were explored and are reported in the remaining sections of this chapter.

7.2.1.4. Effects of teacher 'regulatory talk' on student self-regulatory behaviours in more challenging tasks

As has been mentioned, teacher 'regulatory talk' was analysed using a specially developed coding scheme looking at three types of talk: *Directive talk*, *guiding talk* and *self-regulatory talk*. Similar to the procedures followed to answer R.Q.8, due to the limited number of classrooms sampled (n=8) and the reduced degrees of freedom this brought to estimations, each type of teacher 'regulatory talk' was included as a solo variable of interest in multilevel regressions only controlled by parental education (in linear and quadratic form). Given that classrooms were found to be more relevant over students' self-regulation when approaching more challenging tasks, the importance of teacher 'regulatory talk' over students' self-regulation was only analysed considering students' averages across the tasks that each child seemed to find more challenging. A description of the analytical codes applied can be found in Section 4.1.3.2. To assist the interpretation of the results, some examples of a few ways in which teachers made use of different types of teacher 'regulatory talk' are offered below.

Excerpt 1 Teacher-student communication; Examples of guiding talk.

Context: Students are about to start learning to use descriptive language. They have been presented with a picture of a landscape including trees and flowers. (Children´s names have been change for pseudonymous.)

1 T. (To class) OK, so who's got an answer? We'll just go with this first question. That's fairly straightforward. I should be able to pick anyone to talk about what does this photo show you. (Children volunteer answers) Umm, Jessica?

2 Jessica. Trees and bluebells.

3 T. Trees and bluebells, anything else, Pete?

4 Pete. Lots and lots of grass.

5 T. Lots and lots of grass on, **between the bluebells**. OK, Claire?

6 Claire. Mud

7 T. Mud? **Where can you see mud?**

8 Claire. Ummm

9 T. **I can't see mud but there would be mud under the grass, wouldn't there? OK, so you're thinking of what else would be there, so mud is there but you can't see it.** Ah, Alfie?

10 Alfie. Nature.

11 T. Nature, OK, lovely, yeah, **there might be nature, could be some animals in the trees or in between the bluebells**. Michelle?

13 Michelle. Branches.

14 T. Branches, yeah, branches on the trees. Ruth.

15 Ruth. It sort of shows you what season it is.

16 T. OK, what, so I was having a discussion with Ellen about that, **so what season do you think this shows then [Ruth]?**

17 Ruth. Spring.

Throughout the teaching episode in Excerpt 1, the teacher is trying to get students to start thinking about descriptive language by guiding their attention to the different details of the picture as well as visualize what else could be in the 'scene' captured in the picture. The episode contains examples of different types of teacher *guiding talk* (in bold). As explained in section 4.1.3.2.1, teachers use this type of talk to help students to think, unfold and regulate their own thinking by asking guiding questions, elaborating on students' contributions (turn 5, 9, 11), making explicit the relevant aspects of students' own contributions, or requesting from them more related ideas (turn 7 and 16).

Excerpt 2 Teacher-student communication; Examples of self-regulatory and directive talk.

Context: Children are preparing to write stories and are learning about communicating emphasis. To practice, the teacher has asked students to draw a picture of something or someone and emphasize parts of it through the drawing. (Children's names have been changed for pseudonymous.)

1 T (Goes over to a table with a group of students, looks at the work of John) So where's the emphasis? You've done one side bolder, ***why have you done one side bolder?***

2 John. Umm, cos there's sunshine, then on that side it's (inaudible)

3 T. OK, that's fine. Yeah. **Could you draw, could you draw a shadow? You could maybe, in the back down here. A shadow of Grendel. Just try.**

4 Sophie (comes to T showing her image). This (inaudible).

5 T. ***Where's the emphasis, what's the emphasis on?***

6 Sophie. Hmm?

7 T. ***What's the emphasis on?***

8 Sophie. Do you mean this?

9 T. ***The emphasis, what's meant to stand out for us?***

10 Sophie. Do I write it down?

11 T. I want you to explain it to me.

12 Sophie. He smells and stinks

13 T. ***So how can we tell he's smelly?***

14 Sophie (indicating on image). From there.

15 T. ***OK, so how do you make an emphasis on that?*** (long pause) **Make it a bit bolder, put some colour on it, make it green and yellow.**

Excerpt 2 shows how the teacher is trying to make students think about the product of their own learning activity through *self-regulatory talk* (in bold and italics). It also shows how after assessing the progress of John and noticing the high difficulty the task is generating for Sophie,

the teacher provides directions through *directive talk* (in bold only) to either improve their work or ease their struggle. The types of *self-regulatory talk* that can be observed in the episode above is an explicit demand aimed to make students think about their own performance, in this case by reflecting on it (turn 1, 6, 7, and 9), evaluating it (turn 13), or changing it (turn 15). The type of directive talk that can be observed in this example is that of a strong suggestion of a specific way to do something (turn 3 and 15).

Table 7.12 shows the results of the statistical enquiry into the importance of 'regulatory talk' through the application of multilevel regressions using a Maximum Likelihood method. The table provides a reminder of the proportion of the variance of students' self-regulatory behaviours of interest attributable to the classroom level after controlling by parental education (see column with model I). It also shows the relevance of each type of teacher 'regulatory talk' – *self-regulatory*, *guiding and directive talk* – and overall relevance of 'regulatory talk' (as opposed to talk not engaged in regulating students' thinking) for students' self-regulatory behaviours in all other columns (models II.a to II.d).

Table 7.12 Multilevel regression analysis - Effects of teacher 'regulatory talk' and country on student self-regulatory behaviours

Self-regulatory behaviour	Estimated aspect	Model I: Effects of classroom *controlled by parental education*	Model II.a: *Model I + self-regulatory talk*	Model II.b: *Model I + guiding talk*	Model II.c: *Model I + directive talk*	Model II.d: Model I + any type of *regulatory talk*
Planning before	ICC intraclass correlation + (predicted effect coef.)	0.0571	0.0000 (0.055)**	0.0000 (0.020)**	0.0478	0.0000 (0.015)**
	Variance between classrooms	0.0080	0.0000	0.0000	0.0066	0.0000
	Variance within classrooms	0.1326	0.1215	0.1291	0.1313	0.1278
	Model deviance (fit)	42.56	35.78	38.76	41.73	38.26
	Improvement in model deviance		**6.78**	**3.80**	0.83	**4.30****
Asking for clarifications	ICC intraclass correlation + (predicted effect coef.)	0.0203	0.0000 (0.021)**	0.0000 (0.008)*✢	0.0010	0.0000 (0.008)**
	Variance between classrooms	0.0007	0.0000	0.0000	0.0000	0.0000
	Variance within classrooms	0.0330	0.0310	0.0317	0.0329	0.0301
	Model deviance (fit)	-27.15	-31.08	-30.11	-28.12	-32.56
	Improvement in model deviance	-	**3.93**	**2.96**	0.97	**5.41**
Asking for help	ICC intraclass correlation + (predicted effect coef.)	0.0945	0.0946	0.0919	0.0897	0.0945
	Variance between classrooms	0.0040	0.0040	0.0039	0.0038	0.0040
	Variance within classrooms	0.0385	0.0385	0.0385	0.0384	0.0385
	Model deviance (fit)	-16.53	-16.53	-16.73	-16.94	-16.55
	Improvement in model deviance	-	0.00	0.20	0.41	0.02
Effort	ICC intraclass correlation + (predicted effect coef.)	0.2837	0.1860 (0.082)*✢	0.2647	0.2634	0.2139
	Variance between classrooms	0.1005	0.0580	0.0914	0.0912	0.0694
	Variance within classrooms	0.2538	0.2540	0.2539	0.2550	0.2552
	Model deviance (fit)	81.70	78.90	81.19	81.36	79.96
	Improvement in model deviance	-	**2.80**	0.51	0.34	1.74
Maintaining motivation	ICC intraclass correlation + (predicted effect coef.)	0.1009	0.0166 (-0.041)**	0.0000 (-0.018)**	0.0112	0.0000 (-0.015)**
	Variance between classrooms	0.0063	0.0009	0.0000	0.0064	0.0000
	Variance within classrooms	0.0565	0.0519	0.0535	0.5641	0.0509
	Model deviance (fit)	2.42	-5.14	-4.45	2.40	-6.81
	Improvement in model deviance	-	**7.56**	**6.87**	0.02	**9.23**

****Significant predictive effect ($p<0.05$) of reported teacher 'regulatory talk' on students 'self-regulatory behaviours' of interest.

***Near to significant predictive effect ($p<0.10$) of reported teacher 'regulatory talk' on students 'self-regulatory behaviours' of interest.

Grey cells: Indicate an improvement in the overall fit of the model once the explanatory variable (type of teacher regulatory talk) is included. Lower deviance indicates better fit.

✢ Indicates that predictive effects should be considered as irrelevant due to estimation confidence intervals including a zero value.

Among the different types of indicators reported in Table 7.12 above for each self-regulatory behaviour are the intraclass correlation (first row), and estimation coefficient of predicted effect (first row, in brackets). When ICCs of models II.a to II.d are zero, it indicates that all the variance of the self-regulatory behaviour previously found to be attributable to a classroom effect (e.g., 0.0571 or 5.71 per cent of *planning before*), could be considered to be explained by the type of

teacher 'regulatory talk' examined under each column. Estimation coefficients (in brackets within first row) indicate the strength and direction of the predictive relationship between the explanatory variable of interest and the self-regulatory behaviour explained. This predictive effect is reported next to ICCs only when found to be statistically significant (**) or close to statistical significance (*) (given the lack of power provided by only 8 classrooms), and/or when the type of 'regulatory talk' considered improved significantly the fit of the predictive model. Coefficients of estimations including zero in their confidence intervals are indicated with a cross (✢) and not considered as a finding of interest.

Regressions were carried out considering the percentage of teachers' classroom speech turns containing elements of 'regulatory talk' as input and the cross-tasks average of each type of self-regulatory behaviour measured using the 4-point scales as output. Therefore, regression coefficients represent estimations of the effect that incrementing particular types of teacher 'regulatory talk' by 1 per cent in the classroom could have over the extent to which students manifested self-regulatory behaviours within a range of 0 to 3.

Among the other indices reported in Table 7.12 are between-classrooms variance (second row), within-classroom variance (third row)[46], model fit or deviance (fourth row), as well as levels of improvement in model fit (fifth row). Model fit or deviance indicates the degree to which the explanatory variables considered are able to account for changes in the self-regulatory behaviours explained. Deviance improvements of 2+ per each added variable are considered to be statistically significant (Snijders and Bosker, 2012) in comparison to the base model (model I).[47] Significant improvements in model fit are highlighted in grey.

Results indicate that, under more challenging task conditions, the only self-regulatory behaviours that are significantly explained by teacher 'regulatory talk' were *planning before, asking for clarifications* and *maintaining motivation*. In particular, the level of *planning before* (i.e. examining the cube assembly task goal model before engaging in actual building) was found to be explained by teachers' *self-regulatory talk*, *guiding talk*, and undifferentiated 'regulatory talk'. Specifically, 5.71 per cent of the variance of student *planning before*, previously found to depend on the classroom after *parental education* was considered, seemed to be explained by *self-regulatory talk*. As indicated by the predictive effect (coef. 0.055, z=2.76, p=0.006, C.I. = 0.016 –0.951), the higher the amount of teacher *self-regulatory talk* in the classroom, the more

[46] Within-classroom variance indicates the level to which participants from the same classroom vary in relation to the self-regulatory behaviour explained. Between-classroom variance indicates the level to which participants from different classrooms tended to vary in relation to the self-regulatory behaviour explained.

[47] A smaller deviance indicates a better fit of an explanatory model. A difference of '2' between model deviances for each parameter (independent or control variable) added to the model indicates an improvement in the explanatory model. In this case, a smaller or more negative deviance (fourth row, Table 7.12) evidences the importance of a particular 'regulatory talk' (explanatory variable) for the explanation of a target 'self-regulatory behaviour'.

students planned their activity before carrying out the individual cube assembly tasks. A similar effect on *planning before* was found from *guiding talk* and undifferentiated 'regulatory talk', which also explained 5.71 per cent of this 'self-regulatory behaviour'. The more teachers guided (coef. 0.020, z=2.07, p=0.039, C.I.= 0.001 – 0.039) or simply regulated students' thinking (coef. 0.015, z=2.20, p=0.028, C.I.=0.002 – 0.030) – regardless of whether they did it in a directive, guiding or self-regulatory way – the more students planned their individual cube assembly tasks before engaging in them actively. Judging by the magnitude of the regression coefficients, *self-regulatory talk* was the strongest 'regulatory talk' predictor of *planning before* (0.055 rather than 0.020 of *guiding talk*, and 0.015 of the overall 'regulatory talk').

Additionally, students' *asking for clarifications* was found to be related to teachers' *self-regulatory talk*, which explained the whole 2.03 per cent of the intraclass correlation (ICC) found to vary according to classrooms after *parental education* was considered. As indicated by the predictive effect, displayed in brackets by this ICC (coef. 0.021, z=2.03, p=0.042, C.I.= 0.001 – 0.041), higher levels of *self-regulatory talk* related to students asking for more clarifications when carrying out the cube assembly tasks. The effect of teachers' undifferentiated 'regulatory talk' was similar. It also explained the whole 2.03 per cent of the variance of *asking for clarifications* found to vary according to classroom. The more teachers regulated students' thinking, regardless of whether this was done in through *directive*, *guiding or self-regulatory talk*, the more students *asked for clarifications* in the cube assembly tasks (coef. 0.008, z=2.40, p=0.016, C.I.= 0.002 – 0.015).

Students' *maintaining motivation* was found to be related to teacher 'regulatory talk', although negatively. Specifically, it was found to relate to *self-regulatory and guiding talk*, as well as overall 'regulatory talk'. *Self-regulatory talk* explained 8.43 per cent of the intraclass correlation (ICC) found to vary according to classrooms after *parental education* was considered (i.e. difference between 10.09 per cent of 'model I' and 1.66 per cent of 'model II.a'). Higher levels of *self-regulatory talk* related to students decrease in levels of *maintaining motivation* when carrying out the tasks, as indicated by the negative predictive effect (coef. -0.041, z=-2.98, p=0.003, C.I.= -0.068 – -0.140). The effects of teachers' *guiding talk* and undifferentiated 'regulatory talk' were similar. They explained all the 10.09 per cent of the variance of *maintaining motivation* attributable to classroom effects. The more teachers guided (coef. -0.018, z=-2.91, p=0.004, C.I.= -0.030 – -0.005) or regulated students' thinking, (coef. -0.015, z=-3.36, p=0.001, C.I.=-0.024 – -0.006) regardless of whether this was done in directive, guiding or self-regulatory ways, the less students *maintained motivation* in their individual tasks.

Finally, for the case of *effort* it is relevant to note that there were no statistically significant predictive effects from any type of teacher 'regulatory talk'. Nevertheless, there was an important 9.77 per cent of its variance (difference between 28.37 and 18.60 per cent) related to the classroom level which was explained by *self-regulatory talk* (difference in deviance -measure

of fit- of 2.8 points). Also, interestingly, *directive talk* was not found to have any type of effect over students' self-regulatory behaviours, and 'regulatory talk' was not found to have anything to do with students *asking for (dependency-oriented) help* under more challenging task conditions.

7.2.1.5. Summary

Teachers 'regulatory talk' was found to account for important degrees of some of the self-regulatory behaviours thought to be influenced by classroom culture. Specifically, under more challenging task conditions, this type of teacher talk was found to be relevant for students' *planning before*, *asking for clarifications* and *maintaining motivation*. *Planning before* was positively predicted by *self-regulatory* and *guidance talk* as well as overall 'regulatory talk'. *Asking for clarifications* was positively predicted by *self-regulatory talk* and overall 'regulatory talk'. Finally, *maintaining motivation* was negatively predicted by *self-regulatory* and *guidance talk* as well as overall 'regulatory talk'. The classroom variance of students' *effort*, on the other hand, was found to be explained to important degrees by teacher *self-regulatory talk*, but the predictive relationship between this teacher talk and student *effort* was not found to be of statistical significance. There also were two types of null predictive effects worth mentioning: *Directive talk* was not found to have any effect on self-regulatory behaviours, and *asking for (dependency-oriented) help* was not found to relate to any type of teacher 'regulatory talk' under more challenging task conditions.

7.2.2. RQ8. What is the relevance of classroom motivational culture sustained by teachers through 'socio-motivational talk' for students' self-regulatory behaviours?

This section reports on the importance of teacher-student communication that establishes the classroom motivational climate for learning over student self-regulation. Specifically, the five different types of 'socio-motivational talk' introduced in Section 4.1.3.2.2 are explored here as predictors of student levels of self-regulatory behaviours. As mentioned in previous occasions, teacher 'socio-motivational talk' represented a variety of motivational functions possible to identify in teachers' talk in the classroom. Among the types of talk studied here were: *talk for mastery*, *talk for performance*, *talk for self-efficacy*, *talk against self-efficacy*, and *talk for collaboration*. These types of talk could be considered to reflect teacher communication of educational values – valuing the process of learning, the product of learning or collaborative learning – to students, as well as the way in which teachers construct a supportive or a threatening learning climate for students' sense of competence.

The effect of these types of teacher 'socio-motivational talk' was tested only in the five self-regulatory behaviours that were explored previously in relation to 'regulatory talk' and found to vary according to classroom after controlling for *parental education*: *planning before*, *asking for clarifications*, *asking for help*, *effort*, and *maintaining motivation* (Section 7.2.1.2). Similar to the procedures followed to answer R.Q.7, due to the limited number of classrooms sampled (n=8) and the reduced degrees of freedom this brought to estimations, each type of teacher 'socio-motivational talk' was included as a solo variable of interest in multilevel regressions only controlled by parental education (in linear and quadratic form). Given that classrooms were found to be more relevant over students' self-regulation when approaching more challenging tasks, the importance of teacher 'socio-motivational talk' over students' self-regulation was only analysed considering students' averages across the tasks that each child seemed to find more challenging. Multilevel regressions applying a Maximum Likelihood method, known to be more adequate when including explanatory or control variables into a multilevel regression (Hox, 2010), were conducted. In order to assist the interpretation of results, some examples of a few ways in which teachers made use of different types of teacher 'socio-motivational talk' are offered below.

Excerpt 3 Teacher-student communication; Examples of talk for mastery, collaboration and self-efficacy.

Context: Students are learning to use similes and adjectives to describe objects, places or situations. During the day before students worked describing a big old house that looked abandoned pictured in a storm. Teacher is recapping students use of some descriptive language. (Children's names have been changed for pseudonyms.)

1 T. Now, we came up with this yesterday (reads projector screen) "lightning like a falling star" "lightning glowing faster than the speed of light" "spooky, abandoned, old." Any more we can add to that picture today? Angie?

2 Angie. The house, house is as creepy as a pitch-black haunted house.

3 T. **Wow, (writes on the board) creepy as a pitch-black haunted house. Fantastic!**

4 T. (to class) OK, what I want you to do is talk to the person next to you, I want you to, **I want you to tell the person next to you, from your sheet from yesterday, your favourite bit of description that you came up with**. OK, so just for 30 seconds, or, in fact, one minute, just tell each other what was your favourite bit of description you thought of yesterday to describe the house. Off you go.

5 (Students discuss and teacher approaches one of them) So what was your favourite bit of description you used, Jenny?

6 Jenny. Futuristic.

7 T. ***Futuristic? Hmm, what made you think it was futuristic?***

8 Jenny. (inaudible)

9 T. OK, what about you, Steve? What words did you think of yesterday?

10 Steve. (inaudible)

11 T. A tap drip inside the house? ***Ah, good, and what might that sound like?***

12 Steve. (inaudible) I put, I put (inaudible)

13 T. Hmm, so you can talk about how the tap drips, yeah, could be quite scary. Couldn't you?

Excerpt 3 shows how a teacher reacts to students' learning products. From what can be seen in this example, the teacher promotes the values of improvement and understanding through *talk for mastery* (in bold and italics). This can be seen on the occasions in which the teacher challenges students to take intellectual risks that made their understanding of the learned topic explicit (turn 7 and 11). The extract also shows how the teacher promotes joint learning through talk for collaboration, engaging students in sharing and respecting each others' learning products (turn 4). An example of the promotion of student sense of competence can also be found in turn 3 when through *talk for self-efficacy* (in bold and underlined) the teacher shows a clear value of Angie's idea/performance.

Excerpt 4 Teacher-student communication; Examples of talk for performance and Talk for and against self-efficacy.

Context: Students are producing drawing of bikes which are then going to be exhibited to the school. A student hand it her drawing to the teacher. (Children's names have been change for pseudonyms.)

1 T. **So, we have (inaudible), we have some frames, excellent! I like it, I like it a lot.**

2 Katie. You like it a lot! Do I get a point?

3 T. Hmm, I'm not quite as generous as Mrs X. (looks through drawer)

4 Katie. What are you doing?

5 T. ***Just tidying that little bit up*** that didn't want to be...(teacher erases a bit of a student's drawing) fantastic! So, I'm going to have to mount these (referring to drawings).

6 Katie. You're going to have to do what?

7 T. Mount them, so stick a bit of paper behind it.

8 Katie. (inaudible)

9 T. You mean like a horse?

10 Katie. (inaudible) you mount on a bike. Get it?

11 T. Ahhh (to class), Ummm now class, you now have three minutes. Three minutes.

12 Laura. I'm never going to get it done in time.

13 T. Yeah, you will! **You will if you work a little bit faster than that Laura** (teacher says using a disapproving tone).

In Excerpt 4, the teacher shows a clear value of students' final performance, possibly due to the fact that students' drawings are going to be put on display for the school. The teacher communicates this value to Katie by using *talk for performance* (in bold and italics) that conveys a disvalue of errors and a focus on students' final learning products by making explicit that she (the teacher) is fixing a part of a students' drawing (turn 5). The extract also shows how the teacher manages students' sense of competence. At the beginning of the interaction with Katie the teacher shows great enthusiasm for Katie's drawing (turn 1) making use of *talk for self-efficacy* (in bold and underlined). By the end of the extract, through *talk against self-efficacy* (in

bold), the teacher communicates her disappointment with Laura's performance (turn 13), who the teacher thinks has not been working in as focused a fashion as she could.

7.2.2.1. Effects of teacher 'socio-motivational talk' on student self-regulatory behaviour in more challenging tasks

Table 7.13 shows the same type of information reported previously for 'regulatory talk' in, but this time for the role of teacher 'socio-motivational talk' in student self-regulation. As can be seen in Table 7.13 below, when analysing student self-regulatory behaviour in more challenging tasks, all five types of teacher 'socio-motivational' talk were found to be relevant for one or more self-regulatory behaviours (see grey cells).

In particular, the level of *planning before* (i.e. examining the cube assembly task goal model before engaging in actual building) was found to be explained by teachers' *talk for mastery*, *talk for performance*, *talk for self-efficacy*, and *talk for collaboration*. Specifically, 5.71 per cent of the variance of student *planning before*, previously found to depend on the classroom after *parental education* was considered, seemed to be explained by any of these types of teacher 'socio-motivational' talk. As indicated by the predictive effects, the higher the amount of teacher *talk for mastery* (coef. 0.032, z=3.01, p=0.003, C.I.= 0.011–0.053), *talk for self-efficacy* (coef. 0.029, z=2.06, p=0.040, C.I.= 0.001–0.058), or *talk for collaboration* (coef. 0.042, z=2.23, p=0.026, C.I.= 0.005 – 0.081) in the classroom, the more students planned their activity before carrying out the individual cube assembly tasks of the study. Conversely, higher amounts of teacher *talk for performance* predicted lower levels of *planning before* (coef. -0.065, z=-2.92, p=0.004, C.I.= -0.110 – -0.022).

Furthermore, *asking for clarifications* was found to be significantly predicted by teacher *talk for collaboration*. This type of talk explained the 2.03 per cent of this behaviour found to be attributable to classroom culture. Specifically, the more teachers promoted collaboration among students, the more students tended to *ask for clarification* (coef. 0.023, Z=2.58, P=0.010, C.I.= 0.006 – 0.042). Additionally, *asking for help* was found to be predicted by teachers' *talk against self-efficacy*. This 'socio-motivational talk' explained 5.19 out of the 9.45 per cent of the intraclass correlation found to be attributable to classroom culture. In this case, the more teachers were found to communicate disappointment in students' learning/work or giving feedback to students in a way that could make them feel less able, the more students *asked for help* when carrying out the more challenging cube assembly tasks (coef. 0.107, z=3.48, p=0.000, C.I. = 0.047 – 0.168).

Table 7.13 Multilevel regression analysis – Effects of teachers' 'socio-motivational talk' on students' self-regulatory behaviours (more challenging tasks only)

Self-regulatory behaviour	Estimated aspect	Model I: Effects of classroom once *controlled by parental education*	Model II.a: *Model I + talk for mastery*	Model II.b: *Model I + talk for performance*	Model II.c: *Model I + talk for self-efficacy*	Model II.d: *Model I + talk against self-efficacy*	Model II.e: *Model I + talk for collaboration*
Planning before	ICC intra class correlation + (predicted effect coef.)	0.0571	0.0000 (0.032)**	0.0000 (-0.065)**	0.0000 (0.029)**	0.0361	0.0000 (0.0429)**
	Variance between classrooms	0.0080258	0.0000	0.0000	0.0000	0.0049	0.0000
	Variance within classrooms	0.1325612	0.1186	0.1197	0.1293	0.1319	0.1275
	Model deviance (fit)	42.56	34.56	35.02	38.80	41.45	38.12
	Improvement in model deviance	-	**8.00**	**7.54**	**3.76**	1.11	**4.44**
Asking for clarifications	ICC intra class correlation + (predicted effect coef.)	0.0203	0.0000 (0.010)*✣	0.0000	0.0149	0.0133	0.0000 (0.023)**
	Variance between classrooms	0.0007	0.0000	0.0000	0.0005	0.0004	0.0000
	Variance within classrooms	0.0330	0.0315	0.0328	0.0330	0.0330	0.0296
	Model deviance (fit)	-27.15	-30.42	-28.39	-27.41	-27.48	-33.34
	Improvement in model deviance	-	**3.27**	1.24	0.26	0.33	**6.19**
Asking for help	ICC intra class correlation + (predicted effect coef.)	0.0945	0.0919	0.0699	0.0949	0.0426 (0.107)**	0.0932
	Variance between classrooms	0.0040	0.0039	0.0029	0.0040	0.0000	0.0040
	Variance within classrooms	0.0385	0.0384	0.0383	0.0385	0.0340	0.0386
	Model deviance (fit)	-16.53	-16.75	-17.74	-16.58	-26.57	-16.56
	Improvement in model deviance	-	0.22	1.21	0.05	**10.04**	0.03
Effort	ICC intra class correlation + (predicted effect coef.)	0.2837	0.2067 (0.039)*ns*	0.1848 (-0.091)*✣	0.2835	0.2642	0.2006
	Variance between classrooms	0.1005	0.0661	0.0574	0.1004	0.0910	0.0643
	Variance within classrooms	0.2538	0.2539	0.2530	0.2538	0.2534	0.2561
	Model deviance (fit)	81.70	79.50	78.67	81.70	81.09	79.75
	Improvement in model deviance	**-**	**2.20**	**3.03**	0.00	0.61	1.95
Maintaining motivation	ICC intra class correlation + (predicted effect coef.)	0.1009	0.0000 (-0.024)**	0.0190	0.0000 (-0.023)**	0.0760	0.0000 (-0.043)**
	Variance between classrooms	0.0063	0.0000	0.0011	0.0000	0.0047	0.0000
	Variance within classrooms	0.0565	0.0507	0.0583	0.0555	0.0567	0.0492
	Model deviance (fit)	2.42	-7.04	0.67	-2.58	1.70	-8.49
	Improvement in model deviance	-	**9.46**	1.75	**5.00**	0.72	**10.91**

**Significant predictive effect (p<0.05) of reported teacher 'regulatory talk' on students 'self-regulatory behaviours' of interest.

*Near to significant predictive effect (p<0.10) of reported teacher 'regulatory talk' on students 'self-regulatory behaviours' of interest.

Grey cells: Indicate an improvement in the overall fit of the model once the explanatory variable (type of teacher regulatory talk) is included. Lower deviance indicates better fit.

✣ Indicates that predictive effects should be considered as irrelevant due to estimation confidence intervals including a zero value.

Students' *maintaining motivation* was found to be related to various types of teacher 'socio-motivational talk'. In particular, the whole 10.09 per cent of intraclass correlation found to be attributable to classroom culture was explained by either teacher *talk for mastery* (coef. -0.024, z=-3.40, p=0.001; C.I.= -0.037–0.010), *talk for self-efficacy* (coef. -0.023, z=-2.51, p=0.012, C.I. = -0.042 – -0.005) or *talk for collaboration* (coef. -0.043, z=-3.66, p=0.000, C.I. = -0.067 – -0.020). Interestingly, similar to the effects of 'regulatory talk', all these types of 'socio-motivational talk' were found to be negatively associated with students' *maintaining motivation* in tasks that could be considered to be more challenging.

There were other relationships between teacher 'socio-motivational talk' and students self-regulatory behaviours which, although they did not demonstrate statistically significant

predictive effects, improved the fit of the explanatory model (indicated by changes in model deviance). These were the role of *talk for mastery* over *asking for clarifications* as well as *effort*, and the role of *talk for performance* over *effort*. *Talk for mastery* was found to explain the 2.03 per cent of the ICC of *asking for clarifications* and 7.7 out of the 28.37 per cent of the ICC of *effort* found to be attributable to classroom culture. Finally, teacher *talk for performance* was found to explain 9.89 out of the 28.37 per cent of ICC of *effort* found to be attributable to classroom culture. It might be worth continuing to explore these particular relationships, as it is plausible that a research design with more statistical power than the present study could find statistically significant effects in these relationships.

7.2.2.2. Summary

As shown in Table 7.13, teacher *talk for mastery*, *talk for performance*, *talk for self-efficacy*, *talk against self-efficacy*, and *talk for collaboration* were found to have relevant influences over students' self-regulatory behaviours in more challenging tasks. While *planning before* was found to be positively predicted by teachers promoting students' mastery, self-efficacy and collaboration through talk, these very same types of teacher talk negatively predicted *maintaining motivation*. Additionally, *planning before* was also found to be negatively predicted by teacher *talk for performance*. Furthermore, while *asking for clarifications* was positively predicted by teachers promoting student collaboration through talk, a more dependency-oriented type of help seeking, labelled here as *asking for help*, was found to be positively predicted by teachers being harsher in their evaluation of students' learning, as observed through their use of *talk against self-efficacy*. Finally, the classroom relevance over students' investment of *effort* was found to be partially explained by teacher *talk for mastery* and *talk for performance*, which improved the fit of the explanatory models of this motivational dimension of self-regulation. Notwithstanding, it was not possible to determine the directionality or magnitude of the predictive association between these types of talk and *effort* with precision as their linear relationship was not found to be statistically significant or the estimated coefficient was estimated to fall within a confidence interval including zero.

7.3. Conclusions

The aim of this chapter was to explore the importance of classroom cultures, and within them that of teacher-student communicative patterns, for students' development of self-regulation. Overall, the results of the two research questions provided relevant preliminary evidence about the *culturally adaptive functionality* of self-regulation development. Self-regulation was found to relate to characteristics of classrooms, and within them to cognitive and socio-motivational qualities of teacher-student communication, represented in teacher 'regulatory talk' and 'socio-motivational talk'.

7.3.1.1. Research question 7 conclusion

This research question explored both the extent to which classroom culture and, specifically, teacher 'regulatory talk' related to students' engagement in self-regulatory behaviours outside the classroom. Results showed that classrooms were relevant for behaviours representing cognitive, social and motivational dimensions of self-regulation: *planning before* (cognitive), *asking for clarification* or *for help* (social), *effort* and *maintaining motivation* (motivational). Teacher 'regulatory talk' was found to explain the classroom effects found over students' self-regulatory behaviours such as *planning before*, *asking for clarifications*, and *maintaining motivation*, which represented the three mentioned dimensions of self-regulation.

In terms of theory, the specific ways in which teacher 'regulatory talk' was found to predict students' self-regulatory behaviours provide evidence to suggest that students' appropriation of self-regulatory behaviours to tackle challenging tasks might occur both as a product of the *internalization* of classroom inter-mental thinking processes and a product of classroom *social affordance* via cognitive demands. On the one hand, *self-regulatory talk*, a type of talk directly demanding and therefore affording students' thinking, promoted self-regulation. On the other hand, *guiding talk*, a type of talk that engaged students in joint teacher-student inter-mental thinking about students' own thoughts/performance,[48] was also found to predict higher levels of students' self-regulation. While both types of teacher talk predicted higher levels of *planning before*, *self-regulatory talk* also predicted *asking for clarifications*.

Finally, it is interesting to note that *directive talk* did not have any type of effect over students' self-regulation despite the fact that it represented around a third or more of teacher 'regulatory talk'. In practice, this particular type of 'regulatory talk' replaced students' self-regulatory processes with teacher external-regulation, effectively affording lower opportunities for students to engage in self-regulation and involve students in disjointed and unbalanced inter-mental processes. As such, *directive talk* should have predicted lower levels of students' self-regulatory behaviours. Its null effects suggest that disjointed and unbalanced teacher-student interactions and undermining social affordances centred on students' thought processes for learning were unlikely to have negative consequences over students' self-regulation.

[48] This type of talk could be said to make teacher-student communication an inter-mental metacognitive activity, as teachers use it to: i) make visible (objectivize) elements of students' thinking/performance and make comments (reflect) on such elements in a way that models for students how to think metacognitively about their own current thinking/performance, evaluating and improving it (self-regulating), or ii) assist self-regulation by joining students in the regulation of thinking and performance, asking them questions that elicit and focus their metacognition over their own current learning activity or performance.

1.1.1.1. Research question 8 conclusion

This research question aimed to examine the importance of teacher 'socio-motivational talk' for students' self-regulatory behaviours. The results suggest that the motivational characteristics of teacher-student communication can be a relevant element of the classroom culture explaining students' adoption of self-regulatory behaviours. The specific ways in which teacher 'socio-motivational talk' predicted student self-regulation allows for theorizing that students develop ways of self-regulating which are coherent with i) the affordances created by the educational values of their classroom contexts (e.g., talk for collaboration predicting higher *asking for clarifications*); ii) the extent to which the classroom promotes or damages students' sense of competence (e.g., talk against self-efficacy predicting higher *asking for help*), and; iii) the practices promoted within classroom cultures (e.g., talk for collaboration predicting higher *planning before*). All these mechanisms could be considered to be means through which culture influences the culturally adaptive function of self-regulation behaviours through social affordance. More about how findings related to these mechanisms of social affordance can be found in their discussion within the next chapter (Section 8.3.2).

In general, throughout both research questions, two mechanisms were found to aid the *culturally adaptive functionality* of self-regulation development to teacher-to-student communication, namely students' internalization of inter-mental processes, and adaptation to social affordances. The first was found in the internalization of teacher-to-student inter-mental activity involved in pedagogical guidance as student self-regulation, and that of teachers' judgement criteria of students' learning efficacy as students' personal criteria to make decision about engaging or not in self-regulation. The second mechanism was found to act on many more occasions, and could be divided into direct and indirect mechanisms of social affordance of self-regulation. The first affordance mechanism was directly enacted through teacher demands on students' thinking and practice (e.g., teacher *self-regulatory talk* or *talk for collaboration*). The second was indirectly enacted through the framing of students' self-regulatory behaviour by educational values promoted in the classroom (e.g., teacher *talk for mastery*). In both cases, students developed self-regulatory behaviours in order to adapt to the thinking demands and educational values promoted by their teachers.

The following type of findings supported these theoretical conclusions.

General evidence:

- Classroom cultures predicted students' behaviours representing cognitive, social and motivational dimensions of self-regulation, especially when students faced more challenging tasks.

Evidence of internalization of inter-mental activity:

- *Guidance talk* internalized as higher *planning before*

Evidence of social affordance through direct cognitive demands:

- *Self-regulatory talk* directly afforded higher *planning before* and *asking for clarifications*
- *Talk for collaboration* directly afforded a higher *asking for clarifications*

Evidence of indirect social affordance through educational values:

- *Talk for mastery* and *talk for collaboration* indirectly afforded a focus on understanding, as reflected in higher *planning before*
- *Talk against self-efficacy* socially afforded a fear of failure that promoted students *asking for help (dependency-oriented)* to ensure good performance and protect a sense of competence

Evidence unrelated to either internalization or social affordance mechanisms:

- *Guiding talk* related to a lower level of *maintaining motivation*
- *Talk for self-efficacy* promoted *planning before* but also undermined *maintaining motivation*

Evidence against the relevance of social affordance:

- *Talk for performance* undermined *planning before*
- *Talk for mastery* and *talk for collaboration* lowered *maintaining motivation*

A more in depth analysis of the way in which internalization and social affordance mechanisms might work to explain students' self-regulatory behaviours is presented in the next chapter, which discusses the findings of the whole study.

8. DISCUSSION

This small scale exploratory study examined relationships between culture and self-regulation development. Previous research has indicated relevant links between culture and children's levels of self-regulation, as well as motivational attitudes underlying it. But no attempt has been made, to-date, to start building a theory of how culture might influence the specific behavioural ways in which self-regulation develops across any given age. This study represented a first attempt to help define such a theory.

Participants from two distinctive cultural and educational contexts, Chile and England, served as the basis for the study. These represent collectivist and individualistic cultures respectively (Hofstede, 2017), and are known to have followed different educational traditions (Section 1.2). Children's self-regulation, including its specific behavioural expressions and underlying motivational attitudes, was explored across cultures. While considering specific behaviours allowed to have a better idea of the way culture can influence self-regulation in practice, studying links between motivational attitudes and self-regulation provided insights into the cultural specificity of the motivational dynamics of self-regulation. Finally, in order to understand the concrete mechanisms through which culture might influence self-regulation, the study zoomed in to explore the importance of social interactions, and specifically teacher-to-student communication, for the development of children's self-regulatory practice.

In general, the results suggest that some aspects of children's self-regulation unfold in ways that are responsive to cultural values and practices. In particular, children's levels of self-regulation, specific behaviours into which self-regulation were expressed, and motivational attitudes underlying these behaviours, were found to develop consistently with the values of collectivism and individualism, as well as other values promoted and practices demanded by teachers within classrooms. The results also support the idea that not only children's adoption of, but also the functions taken by self-regulatory behaviours (or strategies) and motivational attitudes relevant for self-regulation depend on cultural context (cultural values, meanings and practices). Furthermore, by relating teaching to children's self-regulation, this study identified two different ways, or mechanisms, through which *social interactions* carried out cultural influences on self-regulation. Specifically, social interactions were found to shape self-regulation through internalization (making external regulatory practices internal) as well as affordance (direct/indirect demand or promotion of self-regulation opportunities) mechanisms.

In this chapter, these and other key findings are discussed in relation to the idea that self-regulation (its behaviours and underlying attitudes) develops, in form and extent, to fulfil *culturally adaptive functionalities* (CAFs), and particularly to fulfil cultural values, meanings, and practical demands.

The chapter is divided into three sections, each of which addresses the different aims of the study and their related research questions (RQs). Summaries of all key findings are offered at the beginning of the discussion of each research question. However, given the theory-building nature of this thesis, of all the key findings, only those found to be relevant for CAF of self-regulation are discussed (and when not discussed, a note is made of it). The limitations of the study, a summary of the study's contributions, as well as its implications for future research, policy, and practice are offered in a subsequent conclusion chapter. The first aim to be addressed is the exploration of the role of culture in self-regulation, and specifically its behaviours.

8.1. *Research Aim 1*: To understand the role that culture might have in self-regulatory behaviours in terms of levels and functions

In order to address this research aim, the cultural (in)variance of self-regulatory behaviours was explored. This included answering research questions in relation to cultural differences in levels of engagement in self-regulatory behaviours, the psychological factors (processes) underlying self-regulatory behaviours in each culture, and the cultural specificity of the predictive functionality of these self-regulatory behaviours in relation to task achievement. The results of each of these specific questions are discussed in separate RQs as follows.

8.1.1. Cultural differences in levels of self-regulatory behaviours (RQ.1)

Results showed that the level of engagement of behaviours representing key phases of self-regulation varied according to culture. Specifically, *awareness of errors* and *effective control of problems*, representing effective metacognitive monitoring and metacognitive control, were found to be higher amongst English students, in comparison to Chilean ones. But the contrary was true in the case of *asking for help* (representing dependency-oriented help-seeking, see Newman, 2002; Stodolsky, 1988). These results are consistent with previous literature, in that they reveal differences in levels of self-regulation in students from different cultures. Such comparisons generally show relatively higher levels of self-regulation in students from Anglo cultures. For example, American students – who are educated within a similar system as British students (Alexander, 2000) – and, also more generally, students from individualistic over those from collectivist cultures. As in this study, this tendency has been found both in relation to metacognitive monitoring (Tang & Neber, 2008) and metacognitive control (Ahadi, Rothbart, & Ye, 1993). The results are also consistent with previous studies comparing help-seeking between more collectivist and individualistic cultures. For example, students from the

Philippines, several Latin American countries (such as Mexico, Brazil and Costa Rica), as well as Middle Eastern countries (including Oman), have been found to rely much more upon others to solve problems than American students (Ogan et al., 2015).

When related to CAF, these results and those from previous literature suggest that the level to which students develop self-regulation (metacognitive monitoring and control), or rely upon other-regulation (help-seeking) when engaged in individual tasks could well depend upon the extent to which their cultures value autonomy or interdependency. That is, the more a culture encourages autonomy, the more likely their children would be to engage in independent problem-solving, and therefore the more opportunities they would have to practice self-regulation and refrain from other-regulation, including help-seeking.

This is also likely to reflect the social affordance of individualism and collectivism over self-regulation development. For collectivists, others are considered to be an important point of reference for the definition of the self (Markus & Kitayama, 1991). Therefore, external self-construal might make it more difficult for collectivist students to draw the line between self- and other-regulation (e.g., Martínez-Fernández and Vermunt, 2015), or to depend more upon other-regulation as a source of self-regulation. The importance of self-construals has also recently been suggested as key to understanding cultural differences in emotion regulation (Jaramillo, Rendón, Muñoz, Weis, & Trommsdorff, 2017), but more research is needed to understand exactly how self-construals influence self-regulation. Some relevant points about this issue will be discussed later, when addressing the links between motivational attitudes and self-regulation across cultures.

The study also showed that Chileans reached lower levels of *final task accuracy* than English participants, despite showing less signs of struggle (as indicated by observed level of task challenge), hence suggesting a higher overconfidence amongst Chileans. As overconfidence has been related to metacognitive knowledge about the self, or a person's knowledge about their own capacities and abilities (Kleitman & Stankov, 2007), this finding suggests that Chileans also demonstrate a lower level of metacognitive knowledge. This result is consistent with a recent cross-cultural study carried out by Stankov and Lee (2014), which included university students from various countries in Latin America (Peru, Argentina, Mexico and Brazil) and the Anglo World (United Kingdom, Ireland, Australia, Canada and the United States of America). The study reported higher levels of overconfidence amongst Latin American students relative to Anglo ones, who were among the least overconfident (more accurate in their self-assessment) of the nine world regions studied.

It is possible that levels of overconfidence might be related to the value given to 'effort for success' in each culture of education. This interpretation is in line with Stankov and Lee's (2014) study, which found that students from various East Asian countries, in which effort is perceived

as important to ensure good performance (Bennett & Flores, 1998; Dandy & Nettelbeck, 2002; Georgiou, 1999; Phillipson, 2006; Rogers, 1998), to be among the least overconfident students. The hypothesis is also consistent with the results of a recent study carried out by Ehrlinger, Mitchum, and Dweck (2016) in the USA, which suggested that higher overconfidence may be linked to the promotion of a fixed theory of intelligence – a theory directly opposed to the attribution of success to effort (Y. Hong, Chiu, Dweck, Lin, & Wan, 1999) – within classrooms. Therefore, the higher levels of overconfidence, and possibly lower levels of metacognitive knowledge amongst Chileans might be due to the lower importance given to effort in achievement situations in general (Section 6.2.1.1). However, higher overconfidence might simply be the result of lower levels of self-regulation, as metacognitive knowledge and self-regulation have been found to exert mutual constitutive influences (Carr, 2010). More research is needed in this area.

Together, the results about differences in levels of self-regulation and overconfidence across cultures corroborate findings from previous studies. They all fit with a theory of *culturally adaptive functionality* of self-regulation, in that they support the importance of the affordance exerted by cultural values (i.e., individualism and the value of effort) for self-regulation (and other-regulation), as well as metacognitive knowledge. The results also invite more research investigating the extent to which overconfidence (a type of personal attitude likely to be culturally afforded) might be an important malleable factor explaining cultural differences in levels of self-regulation. The extent to which self-regulatory functionality of behaviours could be considered to be equivalent across cultures is discussed further in relation to RQ 2.

8.1.2. Psychological factors underlying self-regulatory behaviours in each culture (RQ.2)

Both similarities and differences were found between the Chilean and English students in terms of the factor structure of self-regulation (Sections 5.2.2.2.1 and 5.2.2.2.2). In both countries, a five-factor solution was found to be the best fit. Two of these factors were comparable in nature across cultures, namely those labelled as 'strategic thinking' and 'effortful monitoring'. The other factors extracted, however, showed clear signs of cultural specificity. For instance, while in Chile 'effective monitoring and control' was tapped by one factor, in England 'effective monitoring' and 'effective control' were tapped by two separate factors. Similarly, while in England an 'orientation' factor (associated to *use of model*) was extracted, in Chile a 'non-strategic orientation' factor (associated positively to *use of model* but negatively to *use of building strategies*) was obtained. Lastly, although the 'organisation' factor (associated to following a particular order when building within the cube assembly tasks) was extracted in Chile, this type of factor was not part of the English factor structure.

Also, the observed self-regulatory behaviours were found to be far more indicative of self-regulation in England than in Chile. While they explained between 24% and 66% of the variance of the different self-regulation factors extracted for England, they only explained between 16% and 50% of such variance in Chile. The difference was especially noticeable in the case of the 'strategic thinking' factor, which explained 43.7% of the variance the observed behaviours in England, but only 16.7% of the variance was explained in Chile. However, perhaps the most striking of these cultural differences was the fact that despite being observed to similar degrees across cultures, the behaviour of *evaluation* (or self-evaluation) was found to load as part of self-regulation in England, but not in Chile.

The high cultural specificity of self-regulation factor structures is not a new finding. The finding resembles general results of previous research using questionnaires. For example, the factor structure of the Motivated Strategies for Learning Questionnaire (MSLQ), originally reported by Pintrich, Smith, Garcia, and McKeachie (1993) for American students, did not replicate in Dutch students (Blom & Severiens, 2008). Many culturally specific factor structures have also been found in other self-report measures of self-regulation, such as the Short Self-Regulation Questionnaire (SSRQ) or the Selection, Optimization, and Compensation (SOC) questionnaire (see Gestsdottir et al., 2015). As an illustration, the SSRQ has yielded one- to two-factor solutions amongst White American undergraduates (Carey, Neal, & Collins, 2004; Neal & Carey, 2005), a four-factor solution amongst Spanish undergraduates (Pichardo, Justicia, De la Fuente, Martínez-Vicente, & Berbén, 2014), and a seven-factor solution in White South African undergraduates (Potgieter & Botha, 2009).

The most interesting question for CAF regarding the culturally specific factor structures is, however, why self-regulation factor structures differ as they do across cultures. Although many studies are needed before a more definite answer to such a question can be reached, the present study does provide some relevant insights. Of particular relevance are the findings of differentiation between metacognitive monitoring and control in England, and the non-self-regulatory function of *evaluation* behaviour in Chile. In line with CAF, it could be argued that both of these findings are due to differences in cultural practices across education cultures.

As was mentioned when introducing the contexts of the study (Section 1.2), English classrooms give an important focus to the improvement of children's skills based upon clear objectives and small improvements, aided through continuous feedback (Kelly, Dorf, Pratt, and Hohmann, 2014). Additionally, from 2008, English teachers have been working within the frame of an Assessment for Learning National Strategy that has provided resources and training for effective formative assessment in classrooms (Vlachou, 2015). Consistently, and although not included as part of the classroom analysis within this thesis, it was not uncommon to observe English teachers providing children with time for self-evaluation during the two weeks spent in each participating classroom. They allowed children time for editing their own work, and even to

engage in peer assessments, which helped them to identify what they had done well and what they could improve within their own work. These evaluation situations were generally accompanied by assessment criteria, which helped the children in their learning from the start of each classroom activity.

This contrasts with Chilean pedagogy, where the focus is put upon the transmission of content and the instruction of ways in which things should be done (Martinic et al., 2013). In fact, according to a recent study by Preiss et al. (2014), only 11% of a sample of good or outstanding Chilean teachers (as determined by the Chilean National Teacher Evaluation System) provided (at least once) formative feedback in lessons which they thought reflected their best practice. Moreover, even when asked to carry out effective classroom assessment practices, the types of assessments Chilean teachers present for high-stakes evaluations of their own practice have been found to be ineffectual for students' learning (Taut et al., 2016). Therefore, Chilean classroom assessment clearly contrasts with that of English classrooms, where teachers' use of oral classroom assessment predicts higher reading achievement in students (interestingly, such effects were not found in Canada, New Zealand, or the USA) (Hao & Johnson, 2013).

It is, therefore, possible that the very low level of formative assessment observed, and the ineffectual nature of Chilean classroom assessment in general, could explain the differential function of evaluation actions across cultures. Specifically, this might explain why, when Chilean children evaluate, they do not actually engage in noticing their own errors and subsequently improving their performance (the evaluative function of evaluation actions). The scarce focus on evaluation processes for learning within Chilean classrooms might also be the reason why metacognitive monitoring did not load as a separate factor within this context. Specifically, this may be due to children not being taught how to practice the assessment of their own performance during and after their engagement within learning activities. Such interpretation is in line with the perspective of feedback researchers (Hattie, 2009; Hattie & Timperley, 2007), who have pointed out that it is through formative feedback that children get to understand what they have done well, along with what they need to improve on next in relation to a learning objective. It is also consistent with sociocultural perspectives postulating that children develop their ways of thinking from the types of inter-mental thinking they engage in (Littleton & Mercer, 2013), or from the activities afforded by others, such as teachers (McCaslin & Burross, 2011).

Furthermore, despite dissimilarities in the existence of differentiation between metacognitive monitoring and control across cultures, the fact that these appeared in both cultures evidences the universality of the monitoring-control self-regulation phases. But differences in the definition of many other factors extracted across cultures do suggest that alongside these universal monitoring-control processes, self-regulation takes culturally specific behavioural forms. This was shown in the case of the *evaluation* behaviour already discussed, and it can also

be argued for in relation to many of the differences in behavioural loadings into self-regulation factors across the samples studied. For example, this could be argued to underlie the differences between the 'orientation' factor extracted in England and the 'non-strategic orientation' factor extracted in Chile. Here, the English factor was best represented by students' *use of model*, and the Chilean factor was best represented not only by students' *use of model*, but also by their low *use of building strategies*.

Again, and consistently with CAF, this difference might be attributable to differences in pedagogical practices. Indeed, in Chile the strategy used by children to achieve specific learning objectives is generally dictated by teachers, whereas in England, children are encouraged to use the approach that they personally deem most suitable. In England, the diversity of ways that children apply are generally welcomed by teachers, socialized within the class, and even discussed amongst students. The value placed by the English upon a variety of strategies to achieve any given goal could also be why the 'strategic thinking' factor explained 43.7% of the variance of the observed self-regulatory behaviours in England, in comparison to a lower 16.7% in Chile. The results, therefore, suggest that the *culturally adaptive functionality* of self-regulation might relate more strongly to non-core self-regulation behaviours (i.e., those different from effective monitoring and control). Recent revisions of the MSLQ metacognition scale in American samples do support this idea. The revisions suggest that some specific monitoring actions, such as self-assessment through self-questioning (Tock & Moxley, 2017), or specific control behaviours, such as strategies to clarify confusions (Dunn, Lo, Mulvenon, & Sutcliffe, 2012), could be identified as separate factors coexisting with another more general principal self-regulation factor. Therefore, it might be concluded that culture exerts its role upon self-regulation indirectly, by giving self-regulatory function to 'learned' behaviours (e.g., *monitoring*), rather than directly influencing self-regulation effectiveness (e.g., *awareness of errors*). In order to provide more insight into the role of culture in shaping effective self-regulatory practice, the next section addresses the cultural specificity of the productive function of self-regulation behaviours.

8.1.3. The predictive functionality of self-regulatory behaviours for task achievement across cultures (RQ.3)

The productive role of specific self-regulatory behaviours varied greatly between cultures. Although some similarities were found, the vast majority of the self-regulation behaviours that were predictive of task achievement (*final task accuracy*) predicted it in a culturally specific fashion (Section 5.2.3.1.3). The behaviours of *effort, monitoring*, and *evaluation* – all representing the factor of effortful monitoring (evaluation just in England) – had a positive predictive effect upon task achievement only in England. In addition, *effective control of problems* – representing

the factor of effective monitoring and/or control (depending upon the country) – had a positive effect only in Chile. Furthermore, while the behaviours of *planning before* – representing strategic thinking in both countries – and *concentration* – representing an unfactored behaviour – had a negative predictive effect in England, neither of these had such a negative predictive effect in Chile. There also were some behaviours that were found to predict task achievement consistently within the samples from both countries. These were *awareness of errors*, *planning during (order)*, and *asking for help*. The first two behaviours – representing the factors of metacognitive monitoring and/or control (in Chile and England) as well as organisation (in Chile) – had a positive predictive effect upon achievement in both countries. However, the latter behaviour, resembling dependency-oriented help-seeking (an unfactored behaviour) had a negative predictive effect across countries. Other behaviours did not have predictive effects in either context.

The positive predictive effects of self-regulatory behaviours on task achievement found are consistent with previous research linking self-regulation to student achievement in problem-solving, literacy, and mathematics in five-year-olds up to university-age students (Bielaczyc & Pirolli, 1995; S. Day & McDonald, 2017; Dermitzaki & Kiosseoglou, 2004; Dermitzaki et al., 2009; Hattie, 2009; Schmitt, Pratt, & McClelland, 2014). However, the differences between the relationships reported in this and other studies become clearer when looking at studies linking specific self-regulatory strategies to achievement. In an unpublished PhD study reviewing more than 1200 effect sizes, for instance, Lavery (2008, as cited in Hattie, 2009) reports on the strength of relationships between various self-regulatory strategies and school achievement. Strategies resembling the behaviour of *planning during (order)* ('verbalizing' and 'organising own steps for success' in the meta-analysis), had effect sizes of 0.62 and 0.85 respectively. Strategies resembling the behaviour of *planning before* ('goal setting' and 'planning' in the meta-analysis), also had a positive effect, with an effect size of 0.49. The same positive trend can be found in strategies similar to the behaviours of *evaluation* ('self-evaluation' in the meta-analysis) *asking for help* or *asking for clarifications* ('help-seeking' in the meta-analysis), *monitoring* and *awareness of errors* ('self-monitoring' in the meta-analysis), and *use of building strategies* ('task strategies' in the meta-analysis), which had effect sizes of 0.62, 0.60, 0.45, and 0.45 respectively.

While the positive functions of *awareness of errors* and *planning during (order)* on achievement found across Chile and England were consistent with the 'universal' positive function of self-regulation strategies reported by Lavery, the predictive functions of many other behaviours were not. The results of the present study that differed from Lavery's findings and their notion of universal positive function of self-regulation strategies (or behaviours) were: i) the null predictive effects of *learning from errors*, *use of model*, and *use of building strategies* in Chile and England; ii) the positive predictive effects of *monitoring* and *evaluation* for task achievement in England but not Chile, or the positive effect of *effective control of problems* in Chile but not

England, and more dramatically so in; iii) the negative effects found for *planning before* and *concentration* in England, or *asking for help* in both country samples.

Some of the differences with the positive universal function of self-regulation strategies, however, might be due to issues with the study design or measurement, and therefore could not be seen as indicative of the cultural specificity of self-regulation behaviours. For example, the negative predictive effect of *asking for help* across cultures could be the result of *asking for help* in this study referring to dependency-oriented help-seeking rather than adaptive help-seeking (Newman, 2002, 2003). Indeed, this type of abuse of help-seeking has been found to lead to poorer learning outcomes (Roll, Aleven, Mclaren, & Koedinger, 2011). This type of help-seeking contrasts with the autonomy enabling adaptive help-seeking the literature has linked to higher success (Roll, Baker, Aleven, & Koedinger, 2014).

Furthermore, the null predictive effects found in both countries are likely to be caused by aspects of study design, which have been both beneficial and detrimental in relation to the study's outputs. For instance, these null effects might reflect predictive inaccuracies due to low statistical power bounded to the study's small sample[49] (Nuzzo, 2016). Notwithstanding, due to other aspects of the study design, the results might actually reflect a more accurate picture than previous research designs might have shown. Previous studies have tended to examine the predictive effect(s) of one or two very specific strategies on achievement, rather than the dozen that were investigated within this study. Therefore, unlike the result of the majority of other studies, the results of this study reflect the independent effects of self-regulation strategies after controlling for the effects of many other self-regulation strategies and not just phases (e.g., Muis, Psaradellis, Chevrier, Di Leo, and Lajoie, 2016) or types of strategies (e.g., Lin and Hsieh, 2015). Consequently, the positive effects of self-regulation strategies which might be expected based upon previous literature (e.g., *use of building strategies*) may have disappeared due to their explanation by closely related self-regulation strategies included within this study (e.g., *planning during (order)*). Thus, the null effects found for some behavioural strategies in both cultures may be reflecting the actual universal irrelevance of such behaviours in relation to predicting achievement, at least within the cube assembly tasks applied.

Furthermore, predictive effects found within one country but not the other might be attributable to actual cultural differences rather than issues with study design or measurement, as these were found under the same design and measurement conditions across cultures. Arguably, for instance, the fact that monitoring-like actions, such as *monitoring* and *evaluation*, had a positive predictive function in England, but no function in Chile, could exemplify the point discussed

[49] Although children's behaviours were rated on 300 different occasions within each country sample, these behaviours belonged to the 24 or 25 children from each sample. Therefore, the small number of participants might be the reason why this study has not found positive predictive effects where in fact one might exist.

above regarding the role of educational practice in giving self-regulatory functions to behaviours that otherwise would be ineffectual. In particular, they reflect the fact that English classrooms, but not Chilean ones, focus upon engaging children in self-monitoring and self-assessment within everyday learning. Also, the positive predictive effect of *effort* on achievement found only amongst English students might be indicative of the higher value that is given to effort by children in achievement situations within this cultural context (Section 6.2.1.1), and the extent to which effort becomes strategic in this context. This value and strategic function of effort was visible, for example, in that in the participating English classrooms, children were generally expected to try their best at solving a problem before approaching the teacher for help. For example, it was not uncommon to see children explaining to the teacher the different things (strategies) they had done to overcome a difficulty before asking for their help.

The culturally specific effects of *effective control of problems* could also be considered as evidence of the relevance of culture in giving self-regulatory functions to behaviours. As previously explained, this indicator represented the amount of times a child succeeded in controlling errors, problems, or ambiguities when noticing them (Section 4.1.1.1.5). Therefore, by design, and together with *awareness of errors*, it is a measure of the effectiveness of self-regulation. Considering this, and that the multiple logistic regressions applied allowed the determination of independent predictive effects of each self-regulatory behaviour included as predictor, this finding reflects the extent to which *effective control of problems* predicts task achievement over and above the effect of other 'learned' self-regulatory behaviours. That is, those behaviours different from *awareness of errors* or *effective control of problems* that are not effective in their own right. In particular, the positive predictive effect of *effective control of problems* in Chile and its null predictive effect in England signal that other self-regulatory behaviours can account for the effects of effective control in England, but not in Chile. In other words, the results suggest that in some cultural contexts certain behaviours *become* self-regulatory, to the extent that they can even account for self-regulatory effectiveness.

Whether or not 'learned' behaviours can account for self-regulation effectiveness is likely to depend upon the extent to which each cultural context teaches the self-regulatory function of specific behaviours. That is, whether or not they socialize the self-regulatory use and purpose of such behaviours. The finding that many more 'learned' self-regulatory behaviours (7 v. 2)[50] were predictive of task achievement amongst English in comparison to Chilean students (Section 5.2.3.1.3); and that, on average, the variance of the observed self-regulatory behaviours were explained more by the extracted self-regulation factors in England (40.3%) than in Chile (30.48%) (Section 5.2.2.2), together suggest that the socialization of their self-regulation function was possibly higher in England than in Chile. Hence, this might explain why learned

[50] All behaviours observed except for awareness of errors and effective control of problems.

self-regulatory behaviours accounted for effective self-regulation (metacognitive control) in England, but not Chile. Moreover, considering that the effect of metacognitive monitoring (*awareness of errors*) was not found to disappear through the inclusion of learned self-regulatory behaviours, it could be hypothesised that effective metacognitive control, rather than effective metacognitive monitoring, can be more easily developed from cultural practices.

Finally, the negative predictive effects of *planning before* and *concentration* found only amongst English students could also be attributed to the cultural specificity of self-regulation, but in a different sense. In particular, and similar to differences in overconfidence, they seem to indicate cultural differences in levels of metacognitive knowledge. The negative predictive function of *planning before* amongst English students, for example, might be reflecting their higher accuracy in determining the level of difficulty of a task from the start. Indeed, although tests and physiological evidence demonstrates that planning is predictive of better problem-solving (Cazalis et al., 2003; Mädamürk, Kikas, & Palu, 2016), there is also evidence suggesting that when tasks are considered difficult, people spend more time looking at task goals and the materials provided before fully engaging with it (Byrd, Case, & Berg, 2011; Kaller, Rahm, Bolkenius, & Unterrainer, 2009). Therefore, the results may simply indicate that English students are more accurate at identifying task difficulty, albeit with limited benefits from planning. A similar interpretation could be drawn for the case of the negative effect of *concentration* found only among English students. That is, higher levels of *concentration* may reflect higher levels of awareness of task difficulty amongst English children (Washburn & Thompson Putney, 2001), who might subsequently and adaptively disengage from tasks when considering them to be unattainable (Barber, Grawitch, & Munz, 2012). Different research methods or measures might need to be used to shed light upon the actual culturally specific functions of *planning before* and *concentration*. As there does not seem to be previous studies looking at the culturally specific function of self-regulatory behaviours for either task or school achievement, the findings discussed here are likely to be new to the literature

So far, the research questions discussed suggest that cultural levels of self-regulation might depend upon affording cultural forces, such as values and practices related to individualism/collectivism or effort. Furthermore, factor analyses also suggested that some aspects of self-regulation, specifically those involving behaviours that complement (and therefore differ from) effective metacognitive monitoring and control, are more likely to take their self-regulatory function from cultural practices. Additionally, the last type of predictive analyses evidenced that self-regulation behavioural strategies can also take culturally specific productive functionalities. All these functionalities seem to be gained from cultural practices. Therefore, together, and in line with theorists such as Barbara Rogoff (2003), the results so far are consistent with the idea that cultural values and practices (specifically those surrounding children's competent behaviour promoted through education), are key to understanding the

cultural nature of children's development, and specifically self-regulation (see Trommsdorff, Cole, and Heikamp, 2012 for a similar perspective). Having explored the relationship between culture and self-regulation, the next part of this chapter focuses upon discussing the relationships between culture and the motivational attitudes likely to underlie self-regulation.

8.2. Research Aim 2: To understand the role of culture in the levels and function of students' achievement motivational attitudes underlying self-regulation.

Different enquiries were carried out in order to explore the importance of culture for shaping achievement motivational attitudes which support self-regulation. These enquiries included an exploration of the levels and characteristics of the motivational attitudes adopted across cultures. They also included an enquiry into the cultural specificity of the associations between children's motivational attitudes, effort and other self-regulatory behaviours. For the sake of clarity, and considering the large number of significant relationships found, all relevant results are summarized in tables across the discussion of this research aim, but only results that show some relevance to the enquiry concerning links between culture and motivational attitudes for self-regulation are discussed. Moreover, in order to relate the findings of this study to those of other studies, the specific achievement motivational attitudes expressed by children in their interviews have been equated to widely used psychological motivational constructs within the literature (e.g., *effort approach driven by learning* is equated here to a mastery approach orientation). All equivalences made can be found in Table 8.1 below. Finally, to simplify the large number of cultural differences and culturally specific predictive effects found, at times results are considered and discussed at the level of the strongest common patterns, rather than that of isolated single findings.

Table 8.1 Equivalences between goal oriented motives expressed by students and motivational constructs found within the literature

Goal oriented motive	Related motivation construct
Effort approach driven by learning	Mastery approach
Effort approach driven by performing high(er)	Performance approach
Performance approach driven by performing high(er)	Performance approach
Performance approach driven by feeling able	Performance approach
Performance avoidance driven by performing high(er)	Performance avoidance
Performance avoidance driven by avoiding feeling unable	Performance avoidance
Performance avoidance driven by learning	Mix of mastery approach and performance avoidance
Performance approach driven by learning	Mix of mastery and performance orientation
Effort avoidance driven by avoiding feeling unable	Fear of failure (mastery and performance avoidance)
Performance approach driven by relating to others	Mix of performance orientation and relatedness / Social affiliation goal
Performance avoidance driven by relating to others	Relatedness / Social affiliation goal
Performance approach driven by helping others to learn	Collaborative attitude

8.2.1. Cultural differences in adopted achievement motivational attitudes (RQ.4)

The analysis of the extent to which children adopted specific achievement motivational attitudes indicate three significant differences across cultures. First, English students were more positively oriented towards an *effortful learning approach* (i.e., valued effort more) than Chilean students. Second, Chilean students were found to be more highly oriented towards an *effortful learning approach driven by performing high(er)*; meaning that they valued effort more as a means to demonstrate high performance to others (a sign of performance approach orientation). And third, Chilean students were found to indicate a higher level of *performance avoidance driven by learning*; meaning a tendency to avoid showing an individual's own performance to others in order to focus on learning instead (a sign of a mix between both a mastery approach and performance avoidance orientations).

The results confirm the findings from previous literature suggesting that different motivational attitudes tend to be adopted across cultures (Section 2.6). They add to the literature, however, in highlighting some nuances. For instance, the findings show unusual links between culture and the value of effort for achievement. Unlike the findings reported in other collectivist-individualist comparisons, which involved Asian countries (Section 2.6.1), Chileans were found to attribute a lower value to effort in comparison to their more individualistic counterparts. From this it is possible to consider, in line with the observations of Hau and Salili (1990), that

the educational value of effort, rather than levels of collectivism, might be a better explanatory factor of cultural differences in students' attitudes towards effort. This hypothesis is also consistent with the findings of Martínez-Fernández and Vermunt (2015), who found variance in relation to effort for learning amongst collectivist countries from the Hispanic world, with Colombians (unlike Mexicans, Venezuelans or Spaniards), thinking that effort is unrelated to achievement, for example.

However, the results also suggest that cultural attitudinal profiles cannot be explored only by studying attitudes in an isolated fashion. They need to be considered as part of an attitudinal system. This is supported by the fact that, although compared to their English counterparts Chileans demonstrated a lower level of *effortful learning approach*, they actually appeared to value effort as a tool to achieve more highly (*effortful learning approach driven by performing high(er)*) more than the English. Thus, the results suggest effort cannot be considered only in terms of its general cultural value, but rather in terms of its value in relation to the achievement of specific aims within each culture. This finding is consistent with the extant literature from attribution theory, which indicates that within collectivist cultures, students tend to attribute success to effort when making attributions about social outcomes (i.e., those expected of them by others, such as normative levels of performance) (S. Chen et al., 2009; Luo et al., 2014).

Finally, due to its novelty in relation to the literature, the third and final finding from this research question is perhaps the most interesting. Namely, that Chilean children expressed a higher adoption of *performance avoidance driven by learning*. Previous findings have signalled how performance avoidance orientation predicts higher levels of achievement in collectivist contexts, and specifically within Asian collectivism (Hulleman et al., 2010). Yet, within Chilean collectivism, children reported that they engaged in performance avoidance (i.e., not showing their own performance to others) when they wanted to focus on learning, rather than when they wanted to perform highly. This tension between performance and learning indicates that performance and learning are differentiated, and may even take opposite meanings in children from collectivist cultures. So, unlike what has been previously suggested in the literature (J.-I. Kim et al., 2010; Liem et al., 2012; Meissel & Rubie-Davies, 2016), not all externally defined goals are connected with internal goals among collectivists. This is not to say that there is not a connection between the two in this group, but rather that given the multiplicity of social expectations these students need to juggle together, the external-internal goal consistency will vary according to the set of social pressures that they experience. For example, in the case of Chile, although teachers put emphasis on students showing good performance, excelling above what others have achieved is likely to be socially condemned by peers (Villa, 2012). Therefore, given the tension of social expectations some students might choose to disengage from performance orientations and external expectations and focus on learning instead. This allows

students to avoid social tensions in a socially acceptable fashion. This might not the case within a Confucian context, where excelling is the general social expectation (Lu, Gilmour, & Kao, 2001).

In summary, the overall findings suggest that not only do general values, such as collectivism, influence students' achievement motivational attitudes, but also do those more specific values given to particular behaviours and goals (such as value of effort, excelling to a higher level than others, or investing effort to show good performance). Also, the findings suggest that within collectivist contexts, students might hold motivational goals that consider multiple social expectations (at times conflicting) simultaneously. This idea is further elaborated upon in subsequent sections.

8.2.2. The predictive functionality of achievement motivational attitudes for effort across cultures (RQ.5)

The results from this enquiry indicated that many more achievement motivational attitudes were relevant for *effort* investment among English students than for Chilean ones. In the case of England, a positive, albeit quadratic, effect was found for an attitude akin to a performance approach (*effortful learning approach driven by performing high(er)*). Specifically, holding this attitude made students more likely to engage in medium levels of *effort,* but less likely to engage in high levels of it. Also, and surprisingly, a goal oriented motive representing a certain fear of failure (*effortful learning avoidance driven by avoiding feeling unable*) was found to have a positive predictive functionality on *effort* for this group. Two other predictive goal oriented motives were found to have a negative functionality on *effort* in English students. This was the case for attitudes resembling a mix between mastery and performance approach orientations (*performance approach driven by learning*), and those that mixed achievement with social goals (*performance approach driven by relating to others*). In Chilean students, on the other hand, and consistently with the low overall value given by these students to effort, achievement motivational attitudes were not found to predict higher investment of *effort*, but only lower levels of it. In particular, an attitude akin to a performance approach (*performance approach driven by feeling able*), was the main and only attitude predicting *effort*, and this was in a negative fashion.

One of the most interesting points raised from these findings is the contrast between the positive and negative functions of a performance approach on *effort* in England and Chile respectively. The differential cultural functionalities might be explained by the meanings that each culture gave to performance. Indeed, a side enquiry into two of the goal oriented motives considered to be indicative of a performance approach (*performance approach driven by* either *feeling able* or *performing high(er)*), and for which students' expressions of competitive or social

display tendencies were recorded during analysis[51], supports this idea. While Chileans tended to express these types of performance approaches in relation to social demonstration (in 19 out of 29 ideas), English students tended to express them in more competitive/comparative terms (in 21 out of 29 ideas) (Appendices 6.3.3 and 6.3.5). This is a result in keeping with literature suggesting that while relationships between a performance approach and achievement – a relationship usually mediated by effort (Miñano Pérez et al., 2012) – tend to be positive when questionnaires put emphasis on the 'outperforming others' dimension of a performance approach, they tend to be negative when questionnaires accentuate its 'demonstration of performance' dimension (Hulleman et al., 2010). Arguably, it would not be surprising that due to the higher value they place upon social harmony, children from collectivist contexts expressed their performance approach orientations in terms of the *display* of (socially) expected levels of performance, rather than in competitive terms. Conversely, it is possible that in individualistic cultures, a performance approach might be more likely to be expressed in terms of outperforming others, as social harmony does not need to be maintained to the same degree within such cultures. Hence the productive function of a performance approach might vary according to the meanings given to 'performance' across cultures, and the ways in which these meanings interact with cultural values.

In addition, from the positive predictive effects found of motivational attitudes on student effort within England, it was possible to see how effort and ability are seen as compensatory causes of achievement (i.e., more of one indicates or requires less of the other) by these students. This is a cultural belief that has in fact been previously found in individualistic (Graham, 1991), but not in Asian collectivistic contexts, where students tend to see effort as an important cause of ability and achievement rather than as an alternative to ability (Y. Y. Hong, 2001). This cultural feature was evidenced by two findings. Firstly, it was evidenced by the positive effect of an *effort approach driven by performing high(er)* in England, where the adoption of this attitude made students more likely to invest mid-levels of effort, but less likely to invest high levels of effort. This result indicates that English students are not willing to invest high levels of effort to achieve high performance, even when motivated to do so. Secondly, this cultural feature was evidenced by the finding that English students who expressed a positive orientation towards withdrawing effort (*effortful learning avoidance driven by avoiding feeling unable*) invested only up to mid-levels of effort to protect their own sense of competence. Both findings suggest that English students believed that withdrawing effort can help protect their sense of competence (or

[51] Please note that this excludes an *effortful learning approach driven by interest in performing high(er)*, which is the attitude that had a positive effect (albeit quadratic) on *effort* within England. This is because for this attitude, other characteristics (such as whether or not effort was said to be approached in relation to challenge up-taking, error fixing, or asking for help) were recorded instead of competitive/comparative and display reasons.

ability), which is arguably a sign of a perception that effort and ability are mutually exclusive (compensatory) causes of achievement.

What this finding adds to the literature is that within England, and unlike in the United States, the perception of effort and ability as compensatory causes also corresponded with the positive effect of fear of failure suggested by the benefits that expressing *effort avoidance driven by avoiding feeling unable* had on effort. In a way, this finding challenges previous research indicating that fear of failure, and more so a fear of failure related to self-protection, relates to greater effort withdrawal across cultures (De Castella, Byrne, and Covington, 2013). It could be theorised that when students believe effort and ability to be compensatory causes of achievement, whilst also valuing effort within achievement situations[52], their fear of failure becomes motivating rather than self-handicapping. This has direct cultural relevance, because both the compensatory belief and the value of effort in relation to achievement seem to be culturally based. Once again, the results suggest that the productive function of a particular motivational attitude (e.g., fear of failure) depends upon interactions between cultural meanings (e.g., that given to effort relative to ability) and cultural values (e.g., that given to effort for achievement).

Finally, the negative effects of motivational attitudes on effort among English students seem to indicate the importance of self-defined goals, along with the extent to which tasks allowed students to achieve such goals through effort investment within individualistic cultures. This was evidenced by the fact that both a *performance approach driven by learning* and a *performance approach driven by relating to others* had negative predictive effects on effort in a task that did not allow for the satisfaction of such social- and learning-centred goal oriented motives. This was because the nature of the cube assembly task carried out by children for this study was mainly performative, and centred on fluidity and accuracy (Section 3.4.2.1). The task, therefore, did not allow students to align with their attitudes which led to a low level of effort in a cultural context, such as the English, where self-defined orientations take predominance. Thus, possibly the reason these attitudes were negatively related to *effort* among English students, but not related to it among Chilean ones, follows cultural differences in both the relevance given to self-defined goals, and the extent to which externally-set goals allowed the attainment of self-defined goals.

These results are consistent with research carried out in the United States, where those goals that students considered to be adopted more autonomously proved to lead to higher levels of effort (Sheldon & Elliot, 1998). This tendency was also corroborated in a more recent review study of samples from individualistic cultures, which established positive relationships between

[52] Not only did English children value effort (Section 6.2.1.1), but English teachers also encouraged it. As already mentioned, it was not uncommon to see teachers providing students with improvement goals, for example.

autonomous goals and effort (Gaudreau, Carraro, & Miranda, 2012). Also, similar to the present study, this type of tendency has not been found within collectivist contexts, where relational self-construals conflate social and autonomous goals, and therefore where social-personal goals tend to predict higher effort instead (Gore, Cross, & Kanagawa, 2009).

Overall, the findings discussed for RQ 5 indicate the importance that cultural values and meanings given to behaviours and goals have for the productive function of motivational attitudes. Additionally, the results suggest the importance of the fit between self-defined goals and types of tasks in driving higher effort investment in individualistic contexts, but not collectivist ones.

8.2.3. The predictive functionality of achievement motivational attitudes for self-regulation across cultures (RQ.6)

An extensive number of different types of predictive effects (18) were found between achievement motivational attitudes and self-regulation (equated to higher *awareness of errors* and *planning during (order)*, as well as lower *asking for help*) in Chile (4 effects) and England (12 effects) (see detail in Section 6.2.3.2.4.1). While all the effects found in Chile are summarized and discussed, length restrictions and the need for clarity within this discussion mean that only the strongest types of effects found in England are discussed, (i.e., those with the highest Relative Risk Ratio (RRR), and predicting the highest levels of each self-regulatory behaviour). The predictive effects found are reminded in Table 8.2 to Table 8.4.

Table 8.2 Goal oriented motives predicting planning during (order)

Predictors of Planning during (order)	Effects found (Conf. interval)	Level estimated (reference level 2 'occasional')	Similar concepts to predictive attitude
Chile - Predictors enhancing ↑ chances of higher planning during (order)			
1 Performance approach driven by an interest in feeling able	RRR 1.87** (C.I. 1.08-3.22)	4 high level	Performance approach
2 Performance avoidance driven by an interest in performing high(er)	RRR 7.41** (C.I. 2.39-22.96)	3 mid-level	Performance avoidance
Chile - Predictors lowering ↓ chances of higher planning during (order)			
3 Effortful learning avoidance driven by an interest in avoiding feeling unable	RRR 0.18** (C.I. 0.04-0.79)	3 mid-level	Fear of failure (mastery and performance avoidance)
England - Predictors enhancing ↑ chances of higher planning during (order)			
4 Performance approach driven by interest in learning	RRR 2.37** (C.I. 1.05-5.32)	3 mid-level	Mix of mastery and performance orientation
	RRR 2.78** (C.I. 1.17-6.63)	4 high level	
5 Performance approach driven by interest in helping others to learn	RRR 8.13***(C.I. 3.67-18.00)	3 mid-level	Collaborative attitude
	RRR 3.62** (C.I. 1.50-8.70)	4 high level	
6 Performance approach driven by interest in performing high(er)	RRR 1.67** (C.I. 1.19-2.33)	3 mid-level	Performance approach
	RRR 1.48** (C.I. 1.06-2.06)	4 high level	
England - Predictors lowering ↓ chances of higher planning during (order)			
7 Effortful learning approach driven by interest in performing high(er)	RRR 0.12***(C.I. 0.04-0.36)	3 mid-level	Performance approach
	RRR 0.19** (C.I. 0.06-0.63)	4 high level	

** p<0.05; *** p<0.001

Table 8.3 Goal oriented motives predicting awareness of errors

Predictors of Awareness of errors	Effects found (Conf. interval)	Level estimated (reference level 1 'very low')	Similar concepts to predictive attitude
Chile - Predictors enhancing ↑ chances of higher awareness of errors			
1 Effortful learning approach driven by an interest in learning **(similar effect in England)**	RRR 2.33** (C.I. 1.30-4.15)	2 low level	Mastery approach
	RRR 2.78** (C.I. 1.40-5.52)	3 mid-level	
	RRR 3.76*** (C.I. 1.99-7.10)	4 high level	
Chile - Predictors lowering ↓ chances of higher awareness of errors			
No effects found			
England - Predictors enhancing ↑ chances of higher awareness of errors			
2 Effortful learning approach driven by interest in learning **(similar effect in Chile)**	RRR 2.96** (C.I. 1.58-5.56)	4 high level	Mastery approach
3 Performance approach driven by interest in performing high(er)	RRR 2.09** (C.I. 1.17-3.75)	2 low level	Performance approach
	RRR 2.28** (C.I. 1.33-3.89)	4 high level	
4 Performance avoidance driven by interest in relating to others	RRR 2.93** (C.I. 1.41-6.08)	2 low level	Relatedness / social affiliation goal
	RRR 2.00** (C.I. 1.20-3.35)	3 mid-level	
England - Predictors lowering ↓ chances of higher awareness of errors			
5 Effortful learning approach driven by interest in performing high(er)	RRR 0.14** (C.I. 0.03-0.74)	2 low level	Performance approach
	RRR 0.03***(C.I. 0.01-0.18)	3 mid-level	
	RRR 0.03***(C.I. 0.01-0.15)	4 high level	
6 Performance approach driven by interest in feeling able	RRR 0.14** (C.I. 0.02-0.87)	2 low level	Performance approach
	RRR 0.19** (C.I. 0.07-0.51)	4 high level	
7 Performance approach driven by interest in relating to others	RRR 0.61** (C.I. 0.40-0.93)	3 mid-level	Mix of performance orientation and relatedness / social affiliation goal
	RRR 0.49***(C.I. 0.37-0.64)	4 high level	
8 Performance avoidance driven by interest in learning	RRR 0.00***(C.I. 0.00-0.00)	3 mid-level	Mix of mastery approach and performance avoidance
	RRR 0.18** (C.I. 0.05.0.61)	4 high level	

** p<0.05; *** p<0.001

Table 8.4 Goal oriented motives predicting asking for help

Predictors of Asking for help	Effects found (Conf. interval)	Level estimated (reference level 1 'very low')	Similar concepts to predictive attitude
Chile - Predictors enhancing ↑ chances of higher asking for help			
No effects found			
Chile - Predictors lowering ↓ chances of higher asking for help			
No effects found			
England - Predictors enhancing ↑ chances of higher asking for help			
No effects found			
England - Predictors lowering ↓ chances of higher asking for help			
1 Interest in feeling able	RRR 0.44** (C.I. 0.20-0.99)	2 low level	Achievement seeking

** p<0.05; *** p<0.001

In general, and based upon the equivalences previously suggested in Table 8.1, a mastery approach was found to be productive for self-regulation in both country samples; a performance approach was found to be productive for self-regulation in Chile, but had an inconsistent predictive effect in England; and performance avoidance was found to be productive for self-

regulation only in Chile. Other types of attitudes closely related to achievement goal orientations were also found to have a predictive effect on self-regulation among students. In particular, fear of failure (*effortful learning avoidance driven by avoiding feeling unable*) had a negative predictive effect on self-regulation only in Chile; an attitude indicating students' need for competence (interest in *feeling able*) predicted lower levels of dependency-oriented help-seeking (*asking for help*) only in England; a collaborative attitude (*performance approach driven by helping others*) had a positive predictive effect on self-regulation only in England. Finally, some attitudes mixing different types of achievement goal orientations also had some predictive functions over self-regulation. However, their mixed nature makes them too unspecific to understand their cultural underpinnings, and they therefore will not be discussed here. These were the negative effect of an attitude mixing performance avoidance and mastery approach[53] (*performance avoidance driven by learning*), and the positive effect of an attitude mixing performance approach and mastery approach[54] (*performance approach driven by learning*), both within England.

Most of these findings could be said to be in line with those of previous studies looking at the importance of culture in the relationship between achievement goal orientations and self-regulation. For instance, other studies (Liem, 2016; Wolters et al., 2013) have also found mastery approach to be positively linked to self-regulation in both individualist and collectivist contexts. Similarly, the positive predictive effect of performance approach and performance avoidance on self-regulation in Chile could be considered to be in line with previous studies carried out in other collectivist cultures (R. B. King, 2016; R. B. King et al., 2014; Liem, 2016). But the inconsistency of the findings in England, where performance approach was found to be positively as well an negatively related to higher *awareness of errors* and only negatively related to higher *planning during (order)*, are somewhat at odds with previous studies that have found performance approach only to be positively related to self-regulation in more individualistic contexts (Shim & Finch, 2014; Wolters et al., 2013).

A possible explanation of the unusual relationship between performance approach and self-regulation within England could be the specific nature of the goal oriented motives explored within this study. While the goal oriented motives of *effortful learning approach driven by performing high(er)* and *performance approach driven by feeling able* (both representing less orthodox definitions of performance approach) had negative predictive effects for self-regulation, *performance approach driven by performing high(er)* (more closely related to a

[53] This effect might be due to the inclusion of contradicting goals within one and the same attitude. Therefore, its negative effect might be better explained by the extent to which it requires children to divide their resources for self-regulation towards incompatible aims. As this does not related to culture, this effect is not discussed within the main text.

[54] This effect simply reflects the combined positive effects of performance approach and mastery approach, two attitudes that have been regarded to be positively related to self-regulation in general.

standard definition of performance approach including a focus on positive possibilities and using others' performance as a point of comparison; see Fryer and Elliot, 2008) had a positive predictive effect. So while the findings do actually suggest a positive relationship between performance approach, the negative effects found might suggest a different type of relationship. Namely, a negative relationship between socially-referenced motivational attitudes (investing effort simply to perform high, or engaging in comparing personal performance to others just to boost one's own sense of competence) and self-regulation in individualistic contexts.

Furthermore, the reason fear of failure (*effortful learning avoidance driven by avoiding feeling unable*) was found to have a null effect on self-regulation within England and negative effect in Chile could be due to influences from collectivist and individualist values. Generally, fear of failure has been found to relate negatively to self-regulation (Bartels & Magun-Jackson, 2009). But, as revealed in a recent study by Wolters et al. (2013) conducted in the United States, this negative relationship tends to disappear when effort or ability attributions of success/failure are considered. So the null effects of fear of failure on self-regulation within England might be due to the fact that some of the goal oriented motives included as predictors (and therefore also control variables) in the multiple logistic regressions tapped into students' attributions of success and failure to effort (e.g., *effortful learning approach driven by performing high(er)*, or *effortful learning avoidance driven by performing high(er)*). It is interesting to reflect, therefore, on why such statistical control did not prevent the negative predictive effect of fear of failure on self-regulation within Chile. One cultural hypothesis is that the low distinction that Latin Americans have been found to make between effort and ability as causes of success/failure (Lagos San Martín et al., 2016; Moreano, 2005) might be the root. Indeed, such a non-differentiation would make any statistical control for such an attributional divide rather ineffectual.

The non-differentiation between effort and ability causes of performance is also a psychological characteristic found in people from Confucian cultures (K.-L. Lau & Chan, 2001; Phillipson, 2006). Consequently, one wonders if this should be considered to be a key psychological feature of achievement motivation within the collectivist world, or at least most collectivist contexts. Chances are that if effort and ability are believed to be one and the same cause of performance, then performance might be perceived as controllable and therefore, among collectivists, as an unavoidable social duty toward which one must self-regulate. On the contrary, if effort and ability are seen as compensatory causes of achievement, and effort is not valued as a legitimate means to enhance performance, then levels of performance are likely to be equated to levels of ability. Under such a mindset, children would be more likely to engage in making excuses and other self-handicapping mechanisms rather than self-regulate, just so they can avoid exposing their 'ability' through performance. This finding is in keeping with the importance of interactions between the compensatory belief and the value of effort on the predictive function

of fear of failure. Further research on the extent to which attributions of achievement to effort or ability might explain the function of performance attitudes on self-regulation is clearly needed.

Furthermore, the culture-specific positive effects of performance avoidance (*performance avoidance driven by performing high(er)*) on self-regulation in Chile could be associated with how performance avoidance might be considered to be culturally adaptive within collectivist contexts (R. B. King, 2016). For the case of Chile, the cultural adaptive functionality of performance avoidance might be traced back to cultural values and classroom practices. In particular, it might be traced to the peer disvalue of excelling higher than the reference group (Villa, 2012) in a context where education goals are externally set for and uniform across students, with the same content learned and tests faced by all children at the same time. So, in a sense, within this context, the most adaptive thing to do is to perform well socially by not showing good academic performance to peers. In other words, the positive effect of performance avoidance might be showing that highly self-regulated children tend to adapt to what their culture considers to be appropriate. In a sense, and as (Oyserman, 2007) might suggest, we cannot but self-regulate within what is expected of us.

The positive effect of a collaborative attitude (*performance approach driven by helping others to learn*) on self-regulation in England – the strongest of English effects – follows a similar logic. This finding might be surprising for an individualist context where autonomy is highly valued, but new studies have found positive relationships between collaborative attitudes and higher levels of self-regulation, at least among university students, within these contexts (Lumma-Sellenthin, 2012; Raidal & Volet, 2009). Additionally, higher exposure to well-managed collaborative learning has not only been found to improve students' attitude towards collaboration within individualistic contexts but also, through it, self-regulation (Mentz & Van Zyl, 2016). For the particular case of this study, considering that participating English students were asked to engage in more collaboration than Chileans (Section 7.1), it is likely that 'collaborating' gained its positive meaning and attitudinal functionality from collaborative classroom practice itself. This is a meaning which, in turn, made the role of a collaborative attitude (and not just collaborative practice) productive for self-regulation. Perhaps this finding shows how the cultural practices of a proximal community (classrooms) can override broader cultural values (autonomy) by giving positive meanings to specific behaviours such as collaborating. Once again, the results suggest the importance of interactions (or perhaps in this case even moderation) between cultural values and meanings for the productive function of motivational attitudes.

Finally, *asking for help*, a behaviour considered here to represent dependency-oriented help-seeking and therefore low self-regulation, was found to be negatively predicted by students' interest in *feeling able* within England. The result suggests that the more English children aimed to feel able the less they were willing to depended on others' help. Such management of help-

seeking driven by self-worth protection has been previously documented within individualistic cultures (e.g., Marchand and Skinner, 2007; Ryan, Pintrich, and Midgley, 2001). Consistent with the previous discussion of RQ.5, the finding reflects the extent to which these children believed effortful activity (i.e. not *asking for help*) and ability (feeling able) to be compensatory causes of achievement. Additionally, however, the result shows how the meaning of what it is 'to be capable' can be traced back to the value of autonomy and classroom practice. Indeed, it was not uncommon to see English teachers telling students that they should ask classmates before asking them (e.g., 'ask three before me'), or to see students explaining to their teachers all they had done to overcome a difficulty before asking teachers for their assistance in it. Certainly these practices communicated that help-seeking from adults should be avoided – during the cube assembly tasks children could only ask questions to the researcher – and, probably, that low level of autonomy was a sign of cultural incompetence. Therefore, once again, the data seems to show how the interaction between cultural values (value of autonomy) and meanings given to behaviours (questions to adults) explained the productive role taken by motivational attitudes (*feeling able*) for self-regulation (low *asking for help*).

Overall, the enquiry into the relationship between motivational attitudes and self-regulation across cultures supports the idea that motivational attitudes take their self-regulatory function from culture, hence supporting CAF theory. Similar to the conclusion from previous sections, the results suggest the importance of interactions between cultural values (e.g., value of autonomy and effort) and cultural meanings given to behaviours and goals relevant to self-regulation (e.g., investing effort, collaborating, asking questions to adults) in defining the productive function of motivational attitudes for self-regulation. The enquiries also illuminate the importance of achievement attributions, and concordance between the locus of self-construals and task goals, as cultural moderators of the function of motivational attitudes for self-regulation.

In general, the enquiries carried out in relation to the exploration of culture and achievement motivational attitudes indicate that culture does have an important role in the type of achievement motivational attitudes children adopt, and the motivational function these attitudes have on children's self-regulation behaviours. Specifically, the enquiries are indicative of the thesis that, while differences in adoption of attitudes relate to cultural values, the productive role that attitudes take in self-regulation depends on the way these values interact with the cultural meanings given to behaviours and goals. Specifically, such a role would depend on the meanings given to behaviours and goals in terms of the extent that they represent competence in each culture. Taken together, the results seem to support the *culturally adaptive functionality* of motivational attitudes underlying children's self-regulation behaviours, as children adopted and activated attitudes in a manner that allowed them to adapt in adequate ways to their culture.

8.3. Research Aim 3: To understand the importance of classroom cultures for students' self-regulation, and the specific effects of motivational and cognitive characteristics of teacher talk sustaining such cultures

Taken together, the results discussed so far support the idea that the specific behavioural strategies in which the development of children's self-regulation unfolds, as well as the achievement motivational attitudes energizing such strategies, could depend, to a considerable extent, on the cultural context in which children grow up. The findings, however, do not allow for determination of the specific origins of such cultural influence. As part of an attempt to address this issue, the third aim of this thesis was to explore the importance that classroom cultures sustained by teachers through teacher-to-student communication might have for children's development of self-regulation. Three types of analysis were carried out to explore the importance of the classroom culture on self-regulation: i) the extent to which children's individual differences in self-regulation could be attributed to a 'classroom effect'; and whether or not any classroom effect found could be attributed to ii) the way in which teachers regulated students' thinking (regulatory talk); or iii) to the way teachers framed classroom goal structures and addressed students' sense of competence (socio-motivational talk) when teaching them. The first two analyses are discussed as part of R.Q.7, and the third analysis as part of R.Q.8 as follows.

8.3.1. The relevance of classrooms and teacher 'regulatory talk' for student self-regulation (RQ.7)

Results showed that classrooms were important for student self-regulation after controlling for parental education. The importance of classrooms was stronger when students faced more challenging tasks. Among those behaviours found to vary according to classroom were those representing social, motivational and cognitive self-regulatory strategies. These were *asking for help* and *asking for clarification* (social), *effort* and *maintaining motivation* (motivational), and *planning before* (cognitive). Specifically, the classroom effect on the two 'social' and the one 'cognitive' strategy were found to be equivalent to small to middle effect sizes (2% to 9% ICCs), and the two motivational strategies were found to vary to a level equivalent to middle to strong effect sizes (10% to 28% ICCs).

In general, the results are coherent with previous findings in pointing out the importance of schooling for children's self-regulation development (Section 2.2.2). But they provide a more fine-grain picture by allowing for determination of the specific types of self-regulation behavioural strategies sensitive to schooling. Classrooms were demonstrated to be more

important for motivational (*effort, 28%,* and *maintaining motivation, 10%*) than social self-regulatory strategies (although clearly more important for *asking for help, 9%,* than *asking for clarifications, 2%*) or cognitive ones (*planning before, 6%*). Indeed, an extensive list of behaviours indicative of cognitive self-regulatory strategies were not found to vary according to classrooms at all (i.e. *monitoring*, *awareness of errors*, *learning from errors*, *planning during (order)*, *use of building strategies*). Even though there seemed to be no previous studies reporting the relative importance of classrooms on self-regulatory behaviours to this level of specificity, the high number of studies establishing the relevance of the classroom's natural climate on student effort, engagement, and help-seeking indicate the importance of classrooms on social and motivational self-regulation strategies (Alford, Kayla Rollins, Yolanda Padrón, & Hersh Waxman, 2016; Bong, 2008; Guthrie, 1996; Guthrie & Klauda, 2014; Huston-Stein, Friedrich-Cofer, & Susman, 1977; Jang, Reeve, & Deci, 2010; Linnenbrink-Garcia et al., 2008; Newman & Schwager, 1993; J. C. Turner et al., 2002). This is not to say that classrooms have not been found to be important for cognitive self-regulation strategies. Undoubtedly they have (see Waters and Schneider, 2010), but a revision of the literature seems to indicate that many of the classroom practices that promote such strategies are not natural to teachers but rather learned from academic interventions (e.g., normed collaboration, scaffolding, metacognitive talk) (Sections 2.2.3, 2.2.5 and 2.2.6). Therefore, the lower relevance of classrooms for cognitive self-regulatory strategies may be simply reflecting that instructional techniques such as normed collaboration, scaffolding, or metacognitive talk were not naturally used among the teachers of the participating students (low classroom variance making it less likely to find predictive effects).

Notwithstanding the low sensitivity of cognitive strategies to classroom effects, at the other end, cognitive classroom climate did have an important influence on students' social, motivational, and cognitive self-regulatory strategies. Specifically, when considering students' self-regulatory behaviours exhibited under more challenging task conditions, teacher regulatory talk (self-regulatory, guiding, or directive talk) was found to explain all the variance of students' *planning before*, *asking for clarifications* and *maintaining motivation* previously attributed to the classroom level. *Planning before* was positively predicted by self-regulatory talk and guiding talk as well as overall regulatory talk. *Asking for clarifications* was positively predicted by self-regulatory talk and overall regulatory talk. *Maintaining motivation* was negatively predicted by self-regulatory talk, guidance talk, and overall regulatory talk. *Effort* and *asking for help*, on the other hand, were not found to be explained by any type of teacher regulatory talk, and directive talk was not found to have any effect on any self-regulatory behaviour.

Although previous studies have looked at the relationship between teacher-student interaction and student self-regulation, they almost always have done so looking at its effect on overall levels of self-regulation (Cameron & Morrison, 2011) and at best phases of self-regulation

(Hadwin et al., 2005) rather than specific strategies. And if they have looked at very specific behaviours, they have generally focused on the affective rather than the cognitive quality of teaching (Bong, 2008; Jang et al., 2010), or looked at both aspects as part of an overall teaching composite (Guthrie & Klauda, 2014). Notwithstanding, in general, the findings have similarities with previous studies linking cognitive aspects of teaching and student self-regulation. For example, the positive effects of self-regulatory talk and guiding talk are in keeping with findings of Cameron and Morrison (2011) who reported that when teachers engaged in more explanations and demonstrations, their young students exhibited higher levels of self-regulation; or those by Hadwin et al., (2005) who found that, as teachers enhanced their transfer of responsibility to students, those students tended to show higher levels of self-regulatory control. The results are also coherent with those from the study carried out among University students by van den Boom, Paas, and van Merriënboer (2007) who found that teacher prompting of student reflection and provision of suggestive feedback enhanced students' self-regulation. The positive effects of self-regulatory and guiding talk are also coherent with studies carried out outside the classroom within the caregiving literature (Section 2.2.1) and scaffolding literature (Section 2.2.5). These are all studies that point to the importance of guiding and demanding students' independent activity in self-regulation development (e.g. Díaz, Neal, and Amaya-Williams, 1990). Therefore, cultural practices, specifically those that engage children in self-regulation either by demanding it directly (self-regulatory talk) or by guiding it through inter-mental thinking (guiding talk), could be said to promote children self-regulation across classroom cultures.

Conversely, the negative effects of self-regulatory and guiding talk on students' *maintaining motivation* are somewhat intriguing. Nevertheless, given that a low level of *maintaining motivation* reflected students disengaging when finding a task too difficult, a low level of this scale might be indicating student adaptive rather than maladaptive behaviour. More research is required on the adaptive nature of sustaining motivation v. disengaging to understand this relationship.

Furthermore, the null relationship between directive talk and self-regulation differs from previous findings within the literature as higher external control is generally found to be detrimental rather than ineffectual. Dopkins Stright and Supplee (2002), for instance, found that higher levels of teacher-directed instruction predicted lower levels of student attention to instructions, monitoring, and help-seeking when working with others or individually. The findings are also in opposition to those of Díaz, Neal, and Amaya-Williams (1990) whose seminal work showed how children's reliance on external instructions did not lead to higher but rather to lower self-regulation. Unlike these and other studies in which higher levels of teacher control have been found to short-circuit self-regulation in students (e.g., Grolnick and Ryan, 1987;

Vermunt and Verloop, 1999), this study suggests that higher teacher control is not necessarily detrimental for self-regulation.

One explanation of these unexpected results, however, may be the inclusion of classrooms from two different cultural contexts within a single analysis. Unfortunately, due to the low number of classrooms studied per country no multilevel analysis could be carried out to explore the role of directive talk within classroom effects on self-regulation across countries.[55] Nevertheless, the findings of recent studies suggesting that other- and self-regulation cannot be disentangled within Latin American and Asian countries (Marambe et al., 2012; Martínez-Fernández & Vermunt, 2015) might provide an explanation. Indeed, the negative relationship between adult control and children self-regulation has generally been found in Western contexts. Given that the definition of *self* is more highly dependent on others within collectivist cultures (Markus & Kitayama, 1991), the effect of higher external control embodied in directive talk might not necessarily be detrimental for self-regulation within collectivist contexts such as Chile. Thus, the general null relationship found between directive talk and self-regulation across the eight participating classrooms might be explained by the cancelling effects of possible positive or null predictive effects one may find of teacher control within this Southern country. More research using larger number of classrooms per country is needed to understand the role of teacher directive talk on self-regulation across cultures.

Additionally, the ineffectual relationship between regulatory talk and students' *effort* and *asking for help* is rather puzzling. The results are, however, consistent with a study by Huston-Stein et al. (1977), for example, which found that high levels of teacher directions related to preschool students showing higher compliance but not to their levels of persistence (closely related to investing *effort* and not *asking for help*) during independent work. The reason of the null effects between regulatory talk and persistence in this or within Huston-Stain et al.'s study might be found, however, in the study carried out by Turner et al. (2002) – and on which the definition of regulatory talk was based. Turner et al. concluded that a combination of supportive instructional discourse (one that transferred responsibility to students and negotiated meaning) and supportive motivational teacher discourse (one focused on learning and positive emotion), rather than each of these separately, predicted higher effort investment and help-seeking. Therefore, it is possible that an interaction between the two types of teacher talk (regulatory and socio-motivational) rather than regulatory talk alone would have predicted *effort* and *asking for help*.

A final finding with both substantial and methodological significance is also worth noting. This is namely that of stronger classroom effects on children's self-regulation during challenging tasks

[55] Please note that a simple regression of direct-talk on self-regulatory behaviours would have violated the assumption of independence of errors, and therefore was not pursued.

as opposed to challenging and non-challenging tasks pooled together. Indeed, most previous research has found that classroom interventions targeted at improving self-regulation tend to be effective only among struggling students (Cadima et al., 2016; McDonald Connor et al., 2010). Although the finding of the present study does not directly support or undermine these previous results, it brings into question whether the null effects of classroom interventions on self-regulation for non-strugglers might be due to the use of tasks that are not challenging enough to measure self-regulation in fullness. This methodological concern is also consistent with Perry and Winne's (2013) claim that self-regulation is generally more required when people face challenges. The results of this study are also consistent with those of the only other in which the challenge of the tasks measuring self-regulation was also increased progressively and where effects of classroom characteristics on self-regulation were found for all and not only struggling children (Fuhs, Farran, and Nesbitt, 2013) .

The findings reported here expand on previous literature in many ways. Methodologically, they shed light on the benefits of including challenging tasks when exploring the relevance of the classroom to self-regulation. In more substantial terms, they help to establish that social and motivational strategies relate to characteristics of classrooms more than cognitive strategies. Furthermore, the results expand on the previous findings of Turner et al. (2002) in pointing out that regulatory talk (which includes but is not limited to the features of Turner et al.'s 'instructional discourse') can predict not only social and motivational but also cognitive types of self-regulation strategies. Additionally, the fact that self-regulatory and guiding talk had positive effects on self-regulation suggests the need to expand the type of interaction that qualifies as scaffolding. Not only contingent, sustained and faded types of pedagogical supports should be considered as scaffolding (Section 2.2.5), but also intermittent (and therefore neither sustained nor systematically faded) adjusted (contingent) pedagogical supports. This is of special importance within the context of education given the intermittent nature of teacher-student interactions in everyday classrooms.

Moreover, in theoretical terms, the results support both socio-cultural theories of internalization (effects of guiding talk) and social affordance (effects of self-regulatory talk) as cultural mechanisms explaining the classroom effects on the development of self-regulatory behaviours.[56] The results relate to the idea of the *culturally adaptive functionality* of self-regulation in the sense that regulatory talk made children develop *levels* of self-regulatory behaviours that were adequate to the cognitive demands of their environment. Specifically, when self-regulation was required or promoted (self-regulatory and guiding talk), self-

[56] As already mentioned, this is argued because self-regulatory talk can be considered as a talk type that affords students' self-regulation, as it indicates a direct demand of self-regulation, and suggests students' self-regulation might develop in reaction to such demands. Guiding talk, on the other hand, can be considered to represent a type of inter-mental psychological activity, as it is a talk type that engages with students' current thinking and guides as well as expands it.

regulatory behaviours were enhanced, and when self-regulation was not promoted (directive talk) they were not enhanced. The reasons why some self-regulatory behaviours (or *qualitative form* of self-regulation) and not others varied in their level of expression was also found to follow culturally adaptive patterns, but these were linked to the socio-emotional features of teaching or classroom cultures rather than the cognitive. This will be discussed in the following and final research question.

8.3.2. The relevance of teacher 'socio-motivational talk' for student self-regulation (RQ.8)

Similar to teacher regulatory talk, teacher 'socio-motivational talk' accounted for most of the classroom effect found on students' self-regulation. All types of teacher socio-motivational talk (talk for mastery, talk for performance, talk for self-efficacy, talk against self-efficacy, and talk for collaboration) were found to have relevant effects on student self-regulation when considering challenging tasks and controlling for parental education. *Planning before* was found to be positively predicted by talk for mastery, talk for self-efficacy, and talk for collaboration and negatively predicted by talk for performance. Conversely, the very same types of socio-motivational talk found to predict *planning before* positively, predicted *maintaining motivation* – but negatively rather than positively.[57] Furthermore, while *asking for clarifications* was positively predicted by talk for collaboration, *asking for help* was positively predicted by teachers' harshness measured through talk against self-efficacy. Finally, *effort* was found to be partially explained by teacher talk for mastery and talk for performance, which improved the fit of their explanatory models but were not found to be able to predict *effort* to a level of statistical significance.

Many of the results of this study could be considered to be consistent with the literature. Like previous studies, they highlight the importance of classroom motivation climate and emotional adult support for children's self-regulation (Section 2.2.1 and 2.5.2; or Dignath and Büttner, 2008 for a review). They also reiterate the benefits of mastery rather than performance classroom structures on students' self-regulation, (Urdan and Midgley 2000, cited in Midgley, Middleton, Gheen, and Kumar, 2012; Wolters, 2004) as well as particular classroom practices linked to mastery structures, such as the promotion of collaboration (Newman, 2003) and teachers' reactions to students' errors (Steuer, Rosentritt-Brunn, & Dresel, 2013). But most importantly, and unlike previous studies, taken together the results illuminated the way in

[57] In relation to this latter type of effect, it is important to reiterate, however, that lower levels of *maintaining motivation* could be considered to be evidence of adaptive behaviour. Hence, the negative predictive effects of talk for mastery, talk for self-efficacy, and talk for collaboration on *maintaining motivation* could be interpreted as indicating these types of talk as having a role in promoting students' adaptive behaviour.

which the education values promoted in classrooms, through teacher talk, explained the specific ways in which children developed self-regulation through particular strategies or behaviours. In other words, the results help in understanding the extent and ways in which classroom cultures define the *qualitative form* of self-regulation.

The specific ways in which teacher 'socio-motivational talk' predicted student self-regulation allows for the theorization that students do develop ways of self-regulating which are coherent with: i) the affordance of educational values within their classroom contexts; ii) the way in which classroom contexts managed (were protective of or damaging to) students' sense of competence; and iii) The extent to which classroom cultural practices allowed students to practice specific self-regulatory behaviours or skills underlying them. All these mechanisms could be considered to be affordances of the social context over the development of students' self-regulatory behaviours.

First, the fit between educational values and self-regulation behaviours could be seen, for instance, in the fact that *asking for clarifications* was found among students coming from classrooms where the value of collaboration and mutual respect for ideas was communicated by teachers through talk for collaboration. If one considers that when students ask for clarifications they also make visible their difficulty to understanding something quickly, it is possible that a collaborative rather than a competitive environment was needed for students not to be afraid of loosing social status when requiring assistance.[58] The results are coherent with Newman's (2003) remark that, when collaboration is promoted in the classroom, then students experience a relative lack of social comparisons and learn that is ok not to solve all problems independently. Furthermore, the effect of different 'socio-motivational talk' over *planning before* could also illustrate how self-regulation develops in ways that fit with educational values. *Planning before* was found to be more frequent in students from classrooms with a higher value of understanding/improvement and challenge uptake (talk for mastery). The relevance of talk for mastery for this particular behaviour could be seen in that participating students planned in order to understand the best way to approach a task they found to be difficult. This fits with the value of understanding and facing challenges promoted through talk for mastery.

Interestingly, of all the types of talk identified as linked to educational values, talk against self-efficacy was the only one showing to promote *asking for help*. This is also attuned to a theory about the fit between educational values and self-regulatory behaviours, because students asked for this type of help simply in order to ensure they were not making any mistakes (Appendix 4),

[58] The relevance of collaborative environments for *asking for clarifications* could be also interpreted as both an affordance and an internalization of self-regulation strategy. Students' engagement in collaborative learning require (afford) students to understand each others' perspectives and therefore promotes them to ask questions to clarify ideas in ways that allow inter-subjectivity for joint activity. Such a form of questioning might be later internalized as a way of ensuring individual understanding, which is what is being ensured by students through *asking for clarification* in the cube assembly tasks.

a fear they probably learned from talk against self-efficacy. The result is in line with research suggesting that children from classrooms where teachers portray themselves as 'experts' (judging) engage in more dependency-oriented help-seeking (Stodolsky, 1988). And it is also consistent with recent research that has found how classroom 'error climates' – a construct related but independent from classroom goal structures – can predict students' adaptive behaviour in relation to overcoming errors over and above the effect of classroom goal structures and students' personal goal orientations (Steuer et al., 2013). Considering Steuer et al.'s findings, and that higher levels of *asking for help* were predicted by talk against self-efficacy rather than talk for self-efficacy or talk for performance, it is possible to suggest that help-seeking might be more related to the negative rather than the positive meaning that classroom cultures give to errors or performance in general.[59] This, therefore, once again evidences the power that cultural meanings given to specific behaviours (incurred errors) can have on children's self-regulation. Children seemed to develop self-regulation strategies that fit within not only the values of culture but also the meanings of culture.

The second theoretical point supported by the findings is regarding the relationship between how teachers managed students' sense of competence, and how students' self-regulation developed. The study of teacher talk against and for self-efficacy allowed for such an examination. The nature of the relationships found supports a theory proposing that the specific behaviours students use to self-regulate reflect the strategies they have devised to maintain a positive sense of competence within their particular cultures of education. In other words, students not only develop self-regulation behaviours that are culturally adaptive, but also those that can protect their sense of competence while adapting. This is consistent with previous literature suggesting that students' need for competence as well as self-efficacy are related to self-regulation (Newman, 2002; Williams & Takaku, 2011).

The results supporting this idea evidence that when students are used to teachers praising them, they tend to engage in behaviours that would allow them to maintain a positive self-worth or avoid lowering their self-worth. Indeed, teachers use of talk for self-efficacy made students plan more (higher *planning before*) but also disengage more quickly (low *maintaining motivation*) from difficult tasks. That is, they thought about difficult tasks for longer but if they decided the tasks were too difficult for them, they disengaged more quickly, possibly in order to avoid revealing further unsuccessful attempts. The positive relationship between talk against self-efficacy and *asking for help* previously discussed also supports the idea of students using strategies that allowed them to maintain a positive sense of competence. This makes *asking for*

[59] Note that performance considered teacher reactions to students' errors (communicating the value or disvalue of errors for learning and performance), together with other types of teacher communications that frame classroom performance structures, thus making this type of talk a less sensitive measure of 'error climate' in particular.

help, therefore, a strategy adopted by students both to adapt to the value of 'no errors' and to protect their sense of competence at the same time.

Finally, the explorations showed that self-regulatory behaviours not only developed in order to fit with education values or ensure a positive sense of competence, but also the way in which cultural practices (promoted to fulfill cultural values) allowed children to practice psychological capabilities for self-regulation. This was observed in the positive effect of talk for collaboration on student *planning before*. Collaborating required children to engage in abstract thinking to understand each others' perspectives. This engagement might have allowed children to develop abstract thinking itself, a capacity greatly required when planning ahead (Luria, 1981). Alternatively, the effect of talk for collaboration might be explained by the fact that in order to collaborate children need to engage in coordinating by planning their activity first. The result, therefore, might be indicative of the importance of cultural practices for the development of certain capacities enabling self-regulation behavioural strategies.

Notwithstanding, there also were some findings that did not seem to support the theory of *culturally adaptive functionality* of self-regulation at the level of the classroom. For instance, *planning before* was found to be lowered rather than enhanced by teacher talk for performance. That is, the more teachers promoted a value for good final products, the less students engaged in *planning before*. True, this is a finding consistent with the literature (Section 2.5.2), but if self-regulation were to be developed as a function of cultural values, then talk for performance should have predicted higher planning in students because by engaging in planning children attempt to reach better final results. It is possible, however, that this finding might be driven by the fact that by engaging in longer periods of planning children might have felt they were decelerating their performance. Indeed, if one considers that talk for performance valued not only good but also swift performance (see coding scheme in Table 4.6), then the results might still be in keeping with a CAF theory of self-regulation behaviours. Specifically, when quick performance is valued, to fit with this expectation, children tend to rush through tasks, hence planning less.

Also, the fact that *effort* was not predicted by any socio-motivational talk might be seen as evidence against the *culturally adaptive functionality* of self-regulation. Indeed, the result is unexpected because many socio-motivational talk types did manage student effortful behaviour in one way or another; by promoting good performance, improvement or addressing children's sense of competence. But, as already discussed for R.Q.7, in order to predict motivation regulation for learning, both cognitively and motivationally relevant aspects of teaching might need to be considered simultaneously rather than separately (J. C. Turner et al., 2002).[60] If

[60] Please note that due to the word restrictions of this dissertation, the joint effects of regulatory talk and socio-motivational talk were not examined.

students cannot count on sufficient support to overcome challenges, the chances are that they will adopt the habit of not engaging in effortful behaviour to overcome challenging tasks (such as the more difficult cube assembly tasks) regardless of whether they are initially motivated or not. Such an interpretation resonates with research suggesting that people tend to disengage from tasks that are too challenging for them (Locke & Latham, 2002).

Therefore, perhaps the strongest evidence against a CAF theory of self-regulation are the negative effects of talk for mastery and talk for collaboration on students' *maintaining motivation*. Talk for mastery should have motivated rather than demotivate student engagement because talk for mastery promoted challenge uptake (Section 4.1.3.2.2). Also, the predictive effect of talk for collaboration on student motivation does not seem to follow any apparent adaptive function. One way of understanding these effects might be that both promotion of mastery and collaboration do enhance student adaptive behaviour in individual tasks (e.g., improvement) or social tasks (coordination), respectively. Therefore, if low *maintaining motivation* could be considered to be indicative of adaptive disengagement in unattainable tasks, then the results might be considered to be in keeping to some degree with a theory of CAF of self-regulation. But again, more research is needed to fully understand this relationship.

In general, as well as being consistent with previous literature, and despite some exceptions, most results linking teacher 'socio-motivational talk' and student self-regulation supported the theory of the *culturally adaptive functionality* of self-regulation development. Students seemed to develop ways of self-regulating which allowed them to fit with the education values of their classroom contexts while protecting their sense of competence. Some self-regulatory behaviours also seemed to developed in line with the particular practices that were promoted and the positive meaning that such practices were given within classroom cultures. All these tendencies could be considered to provide evidence that the way in which social context exerts affordances that develop students' self-regulation habits is consistent with CAF theory. Moreover, given that the reported self-regulatory behaviours were exhibited by students in tasks carried out away from their classrooms and teachers, the effects of both regulatory talk and socio-motivational talk might also be indicating that social affordances lead to students internalizing teachers' guidance, as well as socio-emotional and cognitive demands, as directing principles and voices of their own; the social voices of the mind (Wertsch, 1991).

9. CONCLUSION

The previous chapter discussed the results of the study in order to position and make sense of them in relation to empirical findings from other studies. This chapter concludes the study by making explicit its limitations as well as methodological, empirical, and theoretical contributions. The very last section finishes the thesis with suggestions of future directions that could further develop the theory of the *culturally adaptive functionality* of self-regulation, as well as take it into the professional world of practice and policy making.

9.1. Limitations of the study

While this study has contributed to existing knowledge in the field by addressing the previously discussed research questions, a number of limitations need to be acknowledged. First, limitations regarding the design of the study included the limitations of sample size and cross-sectional design. The low number of participating students (49) made type II inferential errors more likely to occur (making less likely the finding of true effects). In order to lower the likelihood of type II errors, primary data was analyzed applying the most sensitive possible measurement approaches. For example, a more granular level of observation analysis was chosen when analyzing classroom culture by scrutinizing teacher-student interaction at the level of conversational turns rather than broader episodes, time segments, or whole lessons. For the same reasons, different scales were created to include the whole variety of self-regulatory behaviours that participating children seemed to engage while on task; and tasks of a wide range of challenge were presented to students. Also, the measured achievement motivational attitudes were grounded in children's own interviews rather than on predefined ones.

The small sample size also prevented generalization of results. Although this was an important limitation, the exploratory purpose of the study made this a lesser concern because the objective was to lay preliminary foundations for a prospective theory, as well as inspire further research, rather than confirm a particular hypothesis. The latter is a task for which much bigger and more representative samples would have been required. Moreover, as Alexander (2000) points out, when carrying out comparisons between education cultures what really matters is to ensure the authenticity of the data rather than the generalizability of the findings. Effort was put, therefore, into making the data gathered the most authentic possible. Two weeks were spent in each classroom and formal data collection took place only towards the end of that period. This helped participants to become more familiar and sincere with the researcher, as well as allowing the researcher to judge the authenticity of classroom practices based on their consistency. But ensuring authenticity, in turn, introduced comparability issues to the study. In particular, there

were comparability issues driven by the differences in the number of subjects taught by teachers whose talk was analyzed across cultures. While English teachers tended to teach most school subjects, in Chile they taught only between one and three subjects. Although no cultural comparisons were reported in terms of the effects of teacher talk within each country, the overall predictive effects that teacher talk was found to have on student self-regulation across countries needs to be considered with caution, as more precise estimations could have been reached had all teachers taught all school subjects.

Perhaps the strongest limitation generated by the small sample size, however, was the type of statistical analysis that the sample allowed. Considering that regression models generally work with samples of a minimum of 50 + 8 participants per predictor (Tabachnick & Fidell, 1996) (although new simulations suggest a much less restrictive requirement; see Austin and Steyerberg, 2015), having 49 participants limited the number of variables that could be incorporated into the multilevel regressions before model saturation. As a consequence, given the need to incorporate parental education as a control variable (twice, in raw and quadratic forms), it was not possible to introduce two types of teacher talk as parallel predictors. This prevented determination of the extent to which one type of teacher talk could have accounted for the effect of another on a particular self-regulatory behaviour (their independent effect on self-regulatory behaviours). Notwithstanding, having explored relationships at the most basic level will certainly allow other studies to select the joint effects of teacher talk worth testing in the future.

Additionally, the limited number of classrooms explored by country did not permit for running multilevel analysis separately per country. This would have allowed for exploration of the extent to which the effects of teacher talk could be considered to be culture-specific. An exploration of this type would have been extremely productive for illuminating, for example, how directive talk might have had a different function in a collectivist v. an individualist culture.

Furthermore, the adoption of cross-sectional rather than longitudinal design meant that no claims of causality could be made between culture and self-regulation. This was, however, a deliberate decision given the limited resources of a PhD study and the extent to which this type of design has helped previous scholars to study the relationship between culture and the mind (Cole, 1996; Rogoff, 2003). A longitudinal design would have required the incorporation of fewer variables or participants, as the same variable needs to be measured at different time points for each participant, thus doubling or tripling the amount of observation and analyses. But fewer participants than 49 would have put in jeopardy the accuracy of statistical outcomes. Moreover, a longitudinal study with fewer variables would have been productive if there had been enough previous studies pointing to the specific ways in which culture related to self-regulation. Given the lack of such evidence, an exploratory design incorporating more variables, and therefore allowing the study of various possible ways in which culture related to self-

regulation, was considered more appropriate. Still, the cross-sectional nature of the study prevents causal claims being made and requires understanding that the links of social context and development found in this study may well be considered to be reciprocal relationships. For example, they might be simply reflecting the extent to which teachers adapt their classroom talk to the self-regulatory habits of their students instead.

Finally, there are also some measurement limitations that need to be acknowledged. First, ceiling and floor measurement effects were observed in *maintaining motivation*, *concentration*, *asking for help* and *asking for clarifications*. These types of effects make it less likely for data to behave normally and provide little measurement variability, enhancing the chances of type II error (Lewis-Beck, Bryman, & Futing Liao, 2004). Although most analyses were run using statistical tests that did not assume normality of the data, the analyses using these variables might have suffered the consequences of little measurement variability. For example, their limited variance brought some singularity issues to factor analysis or the prediction of task achievement when including these behaviours (Sections 5.2.2.1 and 5.2.3.1). This prevented the inclusion of all or some of them in these analyses, and therefore prevented a complete picture of self-regulation factors and productive self-regulatory behaviours across cultures.

9.2. Contributions and implications of the study

Notwithstanding the aforementioned limitations, the present study has made a significant contribution to existing knowledge in the fields of psychology and education in a number of ways. These contributions were methodological, empirical, and theoretical, all which are discussed within this section.

9.2.1. Methodological contributions

Previous research has focused on exploring cultural differences at the level of overall self-regulation (Hinnant-Crawford et al., 2016; K. Lau & Chen, 2013; Tang & Neber, 2008) but not specific behavioural strategies. Moreover, although exploring cultural differences in self-regulation factor structures is not new (Blom & Severiens, 2008; Gestsdottir et al., 2015), using observational rather than self-report data to do so is. Adopting such an approach allowed for more certainty about the nature of behaviours claimed to relate to self-regulation factors – as observations overcame the inconsistencies between participants' idiosyncratic definitions and perceptions of their own behaviours and their actual behaviours. Also, unlike previous studies, using observational data allowed for studying the culture-specificity of self-regulation among children, as the validity of other self-report measures of self-regulation have been found to be affected by low self-awareness or verbal barriers among children (Section 3.4.2.1). Therefore, this study contributed to the field by establishing the empirical advantages of using

observational methods to explore the differential functions of self-regulatory behaviours in children from different cultures.

Previous research exploring goal orientations across cultures has called for the use of interviews to better understand the meaning of goals as well as the reasons individuals pursue similar goals in different cultures (Urdan, 2004b; Urdan & Mestas, 2006). Nevertheless, this call does not seem to have been followed up even in studies looking at the reasons adopted by children for engaging in achievement behaviours or the extent to which culture might influence these reasons (e.g., King, Mcinerney, and Watkins, 2012; Michou, Matos, Gargurevich, Gumus, and Herrera, 2016). This study, therefore, made a methodological contribution in showing how interviews can be used in effective ways to explore culture-specific motives and meanings surrounding goal orientations as well as the effects these motives and meanings might have on the function that goal orientations have across cultures. Moreover, this study showed how combining thematic analysis with reliability procedures of inter-judge agreement when analyzing interviews can yield results that are both consistent with previous survey based results, and allow for identification and consideration of new culturally relevant information.

Additionally, the study also contributed to the methods used in the field of classroom research by showing a relatively more efficient way of linking teacher classroom discourse to students' outcomes than seen in previous research. In particular, it established that 3 rather than 10 lessons and 8 rather than 65 classrooms (as previously analyzed by Turner et al., 2002) can provide enough information to allow for finding significant relationships between teaching and student outcomes. Moreover, it also demonstrated that choosing the level of speech turns as the unit of analysis can be as efficient as the more detailed 'idea level' explored by Turner et al., (2002). Furthermore, the study showed that challenging tasks (as opposed to a mix between challenging and not so challenging tasks) allow for unveiling the classroom effects on self-regulation that other studies have not been able to find before among high performing students (Sections 2.2.1 and 8.3.1).[61]

Finally, the study makes methodological contributions by creating a series of new analytical tools. These include the creation of several sub-scales to measure self-regulatory behaviours (planning before, effective control of problems, evaluation, use of building strategies, asking for clarifications), all of which it was possible to apply reliably, and various of which proved to predict task achievement or represented self-regulatory behaviours sensitive to teaching effects. Furthermore, the study discovered six main motives driving 8 to 9 year-olds pursuit of behaviours such as effort investment, challenge uptake, error recognition (all considered as directed towards an effortful learning goal), or engagement in competitions, social comparisons,

[61] In this study, classroom samples included students considered by their teachers as high and low independent learners.

and displays of performance (all considered as performance orientations) within achievement situations and across Chilean and English samples. Specifically, these were the motives of learning, performing high or higher than others, feeling able, avoiding not feeling able, helping others to learn, and relating to others. Finally, the study contributed by developing tools to study the way in which teachers regulated students thinking through talk (regulatory talk) and transmitted the educational value of achieving mastery, performance, or collaborating to students, as well as made them feel able or not able (socio-motivational talk) in relation to their learning in the classroom. These tools could be used (and adapted accordingly) to continue studying the importance of culture and classrooms on self-regulation (or other outcomes) in similar or different contexts.

9.2.2. Empirical contributions

The study generated many findings which could be considered to be novel. This was probably due to the originality of the various methods applied in the study and the comparison of students from two types of cultures that have not been compared before within the motivation and self-regulation literature. Only those findings which seemed to differ from those previously found in the literature are highlighted. Moreover, given the quantity of new results and the fact that they have already been discussed previously, empirical contributions are only summarized and referred to in terms of patterns rather than isolated findings, at least when more than one finding indicated similar empirical advances.

First, the study revealed that the main role of culture within the development of self-regulatory behaviours was not so much at the level of adoption of these behaviours as it was at the level of the psychological and productive functionality of these behaviours.[62] Second, the study showed that self-regulation can be considered to be universal and culture-specific at the same time, and that what makes it culture-specific is the particular functions taken by behaviours associated with self-regulation processes.[63] Third, the explorations suggested that the effectiveness of self-regulatory behaviours could be gained from the socialization of schooling and, therefore,

[62] This was evidenced by the contrast between the few differences found across country samples in levels of engagement in self-regulatory behaviours – differences only related to *awareness of errors* and *effective control of problems* and *asking for help* (Section 5.2.1)– and the many cultural differences found when exploring the factors underlying these behaviours (psychological self-regulatory functionality) and their predictive role on task achievement (productive functionality) across cultures (Sections 5.2.2.3 and 5.2.3.1.4).

[63] Just to give some examples, self-regulation seemed to have orientation, monitoring, control, and strategic thinking as its universal aspects, but these factors were full of culture-specific behavioural nuances, as they tended to be defined by different behaviours in each context. Indeed, only two out of five factors (effortful monitoring and strategic thinking) were found to be defined by (almost) the same behaviours across cultures. In addition, the self-regulatory behaviours representing students' effortful monitoring, such as *monitoring*, *evaluation*, and *effort*, had a positive predictive effect on *final task accuracy* in England but not Chile, showing how the self-regulatory effectiveness of behaviours varies across cultures.

education culture.[64] Moreover, they also suggested that such an influence might be more likely to be found in relation to metacognitive control than metacognitive monitoring.[65] Fourth, analyses showed that behaviours not only can gain their *specific* self-regulatory functionality (e.g., monitoring or control function) and self-regulatory *effectiveness* from culture, but also their *general* self-regulation function.[66]

Furthermore, many other key findings were found from the analysis of achievement motivational attitudes across cultures. First, the findings demystified previous claims about how in individualist cultures students tend to give little value to effort in relation to achievement, or how they tend to attribute achievement to ability rather than effort (Sections 8.2.1 and 8.2.2). Not only was the value of effort in achievement situations higher among English students, but also they held many more achievement motivational attitudes that had a predictive effect on effort investment than their Chilean counterparts. Second, and more generally, the results suggest that the productive function that achievement motivational attitudes have on effort can depend on the cultural meanings given to effort and the educational goal towards which it is directed. For example, the exploration showed that, when effort and ability are believed to be compensatory causes of achievement in a context where students place a high value on effort in achievement situations (as it was the case in England), the maladaptive motivational attitude of fear of failure can take a productive rather than a detrimental predictive role in effort investment. This empirical pattern was also indicated by the opposite functionality that goal oriented motives indicative of a performance approach orientation had on effort investment across countries. While performance approach had a positive predictive function on effort in England, it had a negative predictive function in Chile. This result is most likely driven by the differential meaning given to 'performance', as a goal, in each country sample.[67] Third, the

[64] Self-regulatory behaviours accounted for effective metacognitive control in England but not in Chile. This was evidenced by the fact that while the predictive effect of *effective control of problems* (effective metacognitive control) was completely accounted for in England by self-regulatory behaviours that cannot be considered to be effective by design (i.e. those different from *awareness of errors* and *effective control of problems*), this was not the case in Chile. In Chile, *effective control of problems* continued to be an important predictor of task achievement after controlling for all other self-regulatory behaviours.

[65] In a related fashion, the fact that the predictive function of *awareness of errors* (effective metacognitive monitoring) was not accounted for by the consideration of other self-regulatory behaviours in either country. This empirical pattern was also supported by the finding that the variance of the English 'effective control' factor was the most explained by the self-regulatory behaviours observed among children (66.45% of variance).

[66] This was evidenced by observing how, unlike in England, the behaviour of *evaluation* did not load as part of any self-regu

[67] A post-hoc enquiry into this finding showed that such an opposite predictive function might have been due to how 'performance' was understood in each culture. Whereas performance was given a 'competitive and comparative' meaning within England, it had a 'display' connotation (showing good performance to others) in Chile. This is a differential connotation that has also been found to explain previous inconsistencies between positive and negative relationships found between performance approach and achievement (Hulleman et al., 2010). Hence, the results indicate that cultural differences in the productive function of achievement motivational attitudes might be bonded to differences in the meaning given to the goals (outperforming v. showing performance) children pursue in different cultures.

results show how children who adopt motivational attitudes that are consistent with specific cultural values of their immediate contexts are also more likely to self-regulate to a higher level, suggesting a type of overall adaptive capacity.[68]

Finally, various new findings were identified from exploring the relevance of classrooms and teaching on self-regulatory behaviours. First, classrooms were found to have higher relevance for motivational self-regulatory strategies relative to social or cognitive ones. Second, teacher talk was found to explain the effect of classrooms on these self-regulatory behaviours. Specifically, both regulatory talk and socio-motivational talk were able to account for all the effects that classrooms had on them. Third, teacher talk and student talk (promoted through teacher talk) that engaged children in inter-mental activity was found to predict higher levels of self-regulatory behaviours. Fourth, teacher talk promoting the educational value of understanding and improvement, as well as supporting students' sense of competence, had a positive predictive effect on self-regulatory behaviours. And fifth, teacher talk which promoted the value of final learning products rather than progress and was non-supportive of students' sense of competence had a negative predictive effect on self-regulatory behaviours. Although these three last findings could be considered to be similar to previous studies, they advance knowledge in very particular ways, as is elaborated on below.

Previous research suggests that inter-mental activity does have an important effect on problem solving and academic performance (Mercer & Littleton, 2007; Palincsar & Brown, 1984) and that indeed it affords children engagement in self-regulation within the context in which inter-mental activity takes place (Järvelä & Järvenoja, 2011). But no previous studies seemed to have established relationships between inter-mental activity and individuals' self-regulatory engagements in tasks that are completely disconnected from the context and content in which inter-mental activity was embedded. Moreover, unlike previous studies, the particular relationship found between guiding talk and self-regulation also seems to advance knowledge in the sense that it suggests how effective guidance cannot just be offered through scaffolding (sustained, contingent and progressively faded support), but also through *intermittent* support. That is, support adjusted to children's ongoing mental activity, but which is neither sustained nor progressively faded.

Finally, much previous research has focused on linking students' perceptions of classroom goal structures to their levels of self-regulation (Section 2.5.2). Prior to this study, however, only Turner et al. (2002) seem to have linked the values and emotional tones of teacher talk observed in classrooms to self-regulatory behaviours; and this was only in relation to self-handicapping

[68] This was evidenced by the perhaps not so new finding of performance avoidance to predict higher self-regulation in collectivist contexts (Chile) but not individualist contexts (England); and collaborative attitudes predicting higher self-regulation in England but not in Chile. Both attitudes closely linked to the peer disvalue of excelling above the reference group in Chile, and the value of collaboration for learning promoted by teachers in England.

and help-seeking avoidance behaviours as self-reported by students. The results of Turner et al. showed that children engage less in avoidance strategies when teachers promote mastery through talk and are emotionally supportive, but no relationships were found between students' behaviours and focus on performance or non-supportiveness. The present study, therefore, expands their findings by establishing relationships between: i) student cognitive (and not just socio-motivational) behavioural strategies, such as planning before, and teacher focus on mastery and supportiveness; and ii) lower student cognitive (planning before) and higher student dependency-oriented help-seeking behaviours and teacher focus on performance and non supportiveness.

9.2.3. Theoretical contributions

As previously mentioned, the main objective of this thesis was to begin to initiate the construction of a theory able to reveal and explain the cultural nature of self-regulation development. Throughout this dissertation, a thesis regarding the *culturally adaptive functionality* of self-regulation – suggesting that self-regulation develops in the form of specific behavioural strategies that allow people to adapt to the demands of their cultural contexts – has been scrutinized and nuanced. Much has been said about this preliminary theory throughout the thesis, but a summary of its main ideas developed in this study seems appropriate here.

The results from this study suggest that self-regulation can develop in ways that are adaptive to culture. Specifically, the study suggests that behaviours which are generally considered to be self-regulatory throughout the literature are likely to gain their self-regulatory function (specific and general), as well as effectiveness, from culture. Additionally, the triangulation between the statistical findings of this study, and informal as well as formal observations made of Chilean and English classrooms in this and other studies, suggest that the way in which culture influences the self-regulatory functionality of behaviours is likely to be through schooling practices found in classrooms. Therefore, the study supports the thesis of the *culturally adaptive functionality* of self-regulation and advances a theory of how this occurs.

Furthermore, the findings provide evidence to advance a theory of how the function of motivational attitudes take a productive or a counterproductive role on self-regulation in culturally adaptive ways. Recent studies have given an indication of the cultural nature of such a relationship (R. B. King, 2016; R. B. King et al., 2014; Liem, 2016), but have not offered a theory about the general mechanisms by means of which culture might exert its functional influence. The results from this study suggest that the productive role of achievement motivational attitudes on behavioral correlates of self-regulation vary according to the cultural meanings given to achievement goals (e.g., performance, being competent) and behaviours involved in

self-regulation (e.g., investing effort, asking questions to adults),[69] and the way these cultural meanings take positive or negative connotations against the backdrop of cultural values (e.g., collectivism-individualism, the value of effort, excelling, or autonomy).

Finally, together with the work of other eminent researchers (Cole, 1996; Lave and Wenger, 1991; Rogoff, 2003; Tomasello, 1999; Vygotsky, 1978; Wertsch, 1991), the results from the analysis of classroom and teacher talk effects on children's self-regulatory behaviours in the present study allow us to theorize that the way in which social contexts, and therefore cultures, influence development is by means of social affordance and facilitation of individual internalization. Notwithstanding, unlike previous theorists, the results suggest that social affordances generated by cultural values might have different consequences for self-regulation than those generated by cultural practices and meanings. On the one hand, social affordances exerted by cultural values may be more relevant for the qualitative behavioral forms in which self-regulation expresses itself. On the other hand, social affordances exerted by cultural practices (including thinking practices) and meanings may be more relevant for the facilitation of the internalization of the psychological (self-regulatory) and productive functions taken by these behaviours (and attitudes underling them). The dynamics between all these types of social affordances and internalizations is not something on which the findings shed much light, but given that different types of teacher talk were found to predict the same self-regulatory behaviours, or that particular teacher talk could exert different types of social affordances at once,[70] it is possibly a rather complex relationship.

9.2.4. Implications of the study for research

The study generated some implications for future research and educational practice. First, some improvements to the design and measurement tools of this study could help future research to acquire an even stronger picture of how teacher talk relates to self-regulation or other related outcomes. For example, in relation to maintaining motivation, the results seemed to indicate that teacher talk that predicted higher self-regulation also tended to predict higher levels of disengagement from challenging tasks. But given that previous research has considered persistence to be adaptive rather than maladaptive, more research is required to understand the adaptive nature of persistence in challenging tasks before the role of teacher talk on motivation within these tasks can be better understood. Also, to assist with acquiring more accurate predictions of the role of teacher talk on self-regulation (or other learning features), future

[69] From this, one could also hypothesize that the function that these attitudes might have on other types of activity, (such as reading and writting, problem solving, drama performance, etc.) might depend on the meaning given by children to key goals and behaviours involved in these activities in each culture.

[70] For example, talk for collaboration, transmitted the value of joint activity at the same time that it facilitated the internalization of the self-regulatory function of asking for clarifications and planning by asking to engage in collaboration.

research should look at such relationship by sampling many more classrooms than this study did. Futures studies would also benefit from only sampling classrooms where the same teacher teaches all subjects. This would probably enhance the accuracy of predictive effects found of teacher talk on students' self-regulation. Ultimately, once we know more about the specific self-regulatory aspects and other student outcomes predicted by regulatory talk and socio-motivational talk, more longitudinal designs could be adopted. This would allow for testing whether the extent to which these or other types of teacher talk do actually cause students' self-regulation development.

Additionally, more research is needed to understand the ways in which social affordance and internalization processes work together to develop self-regulation. This could be done by examining the ways that cultural values, practices, and meanings theorized as relevant for students' self-regulation interact to predict self-regulation. In order to do this, for example, future studies might want to incorporate more formal measures of: i) the specific values that teachers and schools seek to promote among children; ii) the meanings educators and students give to key goals such as performance, learning, or competence, and behaviours such as collaboration, errors, effort; and iii) the practices that are given time by teachers or engaged by students in classrooms (such as self-evaluation or planning). Furthermore, to obtain a more comprehensive picture of the psychological factors underlying self-regulatory behaviours in each country, more sensitive measures or measurement procedures to explore behaviours such as asking questions (asking for help or clarifications) and staying engaged (maintaining motivation and concentration) need to be used. In addition, although interviews were clearly a very productive way of understanding children's achievement mindsets, in order to be able to work with larger samples, future studies might benefit from employing mixed methods strategies, such as developing and applying ad-hoc questionnaires based on the analysis of interview responses.

9.2.5. Implications of the study for the promotion of children's self-regulation through educational practice and policy

Finally, the fact that national cultures were found to have important relevance for student self-regulation generates implications for educational policy and practice. In particular, it suggests the need to create national strategies to train teachers to understand, identify and influence the extent to which the values, meanings and practices of their cultural contexts are or are not promoting self-regulation in their students. For example, teachers from more collectivist cultural contexts in which help-seeking tends to be higher among children should make sure they guide their students in the use of help-seeking in such a way that is conducive towards higher self-regulation. In practice, this could be done by asking teachers to set classrooms rules about peer

assistance, such as: i) providing reasoned explanations of any suggestion to peers; or ii) not disengaging from giving help until peers have developed independent proficiency in the assisted activity, or until peers are able to explain why a suggested way of doing things can actually work. These are ways of providing help that can promote the metacognitive level required for the development of self-regulation.

Similarly, in cultures where ability may be more valued than effort such a national strategy, for example, should train teachers to make sure they promote in students the value of effort as a tool that can be used to achieve higher personal ability (i.e. the self-regulatory function of effort). In practice, this could be done by asking teachers to communicate the meaning of effort both explicitly, by direct communication of it, and implicitly by demanding students' investment of effort for the purpose of personal improvement (e.g., editing of personal writing, progress in increasingly difficult arithmetic operations, etc.). In other words, these national strategies should focus on making visible national values (e.g., social interdependence) to teachers so they can think of ways to re-signify the meanings of such values for students (e.g., the value of help-seeking as a tool for autonomy development) and carry out pedagogical practices that support and promote such a re-signification to promote self-regulation.

Moreover, the findings of the culture-specific predictive function of motivational attitudes for effort investment and self-regulatory behaviours for task performance also generate important implications for educational policy and practice. First, they call for Ministries of Education to carry out or fund more research to identify the specific motivational attitudes aligned with higher levels of effort in the children they educate, so teachers can focus on promoting these attitudes and discourage those that predict lower levels of effort within the motivational logics of their culture. For example, English teachers should know that their students tend to invest higher effort when trying to avoid failure. Given the negative consequences this might have for student wellbeing teachers need to address two challenges. First they should re-signify explicitly for students their 'failures' or errors as opportunities for learning. Second, they should promote such a re-signification implicitly by assessing students not only in terms of what they have achieved but also in terms of how they have overcome personal challenges, hence putting the focus on assessment for learning. This should ensure that students develop higher effort at the same time as maintaining a positive mindset.

Moreover, the results also suggest teachers should learn that not all behaviours generally assumed to be self-regulatory are necessarily self-regulatory or productive for achievement within their particular cultures. This does not mean that such culture-specificity is fixed. It suggests, rather, that self-regulatory and productive functionality of behaviours can be learned from cultural modelling and practice. For example, the more teachers promote students' use of behaviours such as planning, pausing to check progress or evaluation to improve performance, the more these type of behaviours are likely to gain a self-regulatory and productive function.

Therefore, teachers should promote the self-regulatory and productive functionality of all behaviours with the potential to be self-regulatory among students by promoting them through the cultural practices within their own classrooms. These could be facilitated by, for example, developing and distributing materials to aid teacher observational identification and assessment of children's self-regulated learning behaviours.

The results of the study also generate a series of recommendations to help shaping teacher-student communication in order to promote student self-regulation. The implications for this originate directly from the relationship the study evidenced between teacher talk and children's self-regulation. Regardless of whether the relationship found between these two sets of behaviours is due to students adapting their self-regulation to teaching or, conversely, teachers adapting their practice to students' self-regulation, the existence of such a relationship calls for teachers to reflect on how their practice links to students' self-regulation. If teachers realize they tend to adapt their practice to student's self-regulation then they need to reflect on how to change this so they promote rather than simply maintain the level and repertoire of self-regulation strategies of their students. On the other hand, if teachers consider that their students adapt their levels and repertoire of self-regulation strategies to their teaching, teachers should reflect on how to ensure they are promoting rather than damaging their students' self-regulation. The positive, negative and null predictive effects found between the types of teacher talk and student's self-regulation in this study can serve as a starting point for this type of teacher reflection. For example, teachers should reflect on the extent that they make use of directive or guiding talk to regulate children's thinking/activity or the extent to which they make use of talk for self-efficacy or against self-efficacy when reacting to their students' learning products. They can then examine how the use of such types of talk may have an effect on the self-regulation of their students. Specific materials could be developed to help teachers in such a reflection. For example, teachers can focus their analysis of the effects that specific types of teacher talk have in some of their students, keeping a record of the type of talk they use intentionally with these students while registering how the self-regulatory behaviours of these students change and progress.

In summary, the implications for educational policy and practice of this study respond to the idea that cultures of education are constantly created and co-created by their members. This suggests that, in theory, it should be possible and desirable to build or re-shape cultures of education in such a way that is beneficial for the self-regulation of children of any culture. Therefore, all behaviours that are generally assumed to be self-regulatory and productive for achievement could reach their full self-regulatory potential in children from any cultural context if they are valued, given self-regulatory meaning, and practiced within their respective cultures. Similarly, motivational attitudes that are given productive meaning in relation to particular self-regulatory behaviours, such as effort for learning, are likely to take a predictive function over the

outcome for which they are promoted. Considering all this, in the future, interventions carried out to promote children's self-regulation should aim to make consistent the values, meanings, and practices of children's educational contexts so that they adopt synergic motivational attitudes and behaviours that accelerate their self-regulatory development. Ultimately, given the strong relationship between self-regulation and educational achievement, this study could be said to have laid the basis for a prospective line of enquiry from which, if taken seriously, many education systems around the world could ultimately benefi

10. BIBLIOGRAPHY

Ahadi, S., Rothbart, M., & Ye, R. (1993). Children's temperament in the US and China: Similarities and differences. *European Journal of Personality*, *7*(5), 359–377. https://doi.org/510.1002/per.2410070506

Alexander, R. J. (2000). *Culture and pedagogy: International comparisons in primary education*. Oxford: Blackwell Publishers.

Alford, B. L., Kayla Rollins, B. B., Yolanda Padrón, B. N., & Hersh Waxman, B. C. (2016). Using Systematic Classroom Observation to Explore Student Engagement as a Function of Teachers' Developmentally Appropriate Instructional Practices (DAIP) in Ethnically Diverse Pre-kindergarten Through Second-Grade Classrooms. *Early Childhood Education Journal*, *44*(6), 623–635. https://doi.org/10.1007/s10643-015-0748-8

Allard, A., & Cooper, M. (2001). "Learning to Cooperate": A study of how primary teachers and children construct classroom cultures. *Asia-Pacific Journal of Teacher Education*, *29*(2), 153–169. https://doi.org/10.1080/13598660120061336

Altman, D. (1991). *Practical Statistics for Medical Research*. London: Chapman & Hall . Retrieved from https://www.amazon.co.uk/Practical-Statistics-Medical-Research-Statistical/dp/0412276305

Ames, C. (1992). Classrooms : Goals , Structures , and Student Motivation. *Journal of Educational Psychology*, *84*(3), 261–271.

Anderman, L. H., & Anderman, E. (2009). Oriented towards mastery: Promoting positive motivational goals for students. In M. Furlong, R. Gilman, & E. Huebner (Eds.), *Handbook of Positive Psychology in Schools* (pp. 161–174). London: Routledge.

Andrews, P. (2009). Comparative studies of mathematics teachers' observable learning objectives: Validating low inference codes. *Educational Studies in Mathematics*, *71*(2), 97–122. https://doi.org/10.1007/s10649-008-9165-x

Angelillo, C., Rogoff, B., & Chavajay, P. (2007). Examining shared endeavours by abstracting video coding schemes with fidelity to cases. In R. Goldman, R. Pea, B. Barron, & S. Derry (Eds.), *Video Research in the Learning Sciences* (pp. 189–206). New Jersey: Lawrence Erlbaum.

Annevirta, T., & Vauras, M. (2006). Developmental Changes of Metacognitive Skill in Elementary School Children. *The Journal of Experimental Education*, *74*(3), 197–225. https://doi.org/10.3102/0002831210365008

Arievitch, I. M. (2008). Exploring the link between external and internal activity from a cultural-historical perspective. In B. Van Oers, W. Wardekker, E. Elbers, & R. van der Veer (Eds.), *The transformation of learning. Advances in cultural-historical activity theory.* (pp. 38–57). Cambridge: Cambridge University Press.

Austin, P., & Steyerberg, E. W. (2015). The number of subjects per variable required in linear regression analyses. *Journal of Clinical Epidemiology*, *68*(6), 627–636. https://doi.org/10.1016/j.jclinepi.2014.12.014

Azevedo, R., Cromley, J. G., Winters, F. I., Moos, D. C., & Greene, J. A. (2005). Adaptive human scaffolding facilitates adolescents' self-regulated learning with hypermedia. *Instructional Science*, *33*(5/6), 381–412. https://doi.org/10.1007/s11251-005-1273-8

Bakeman, R., & Quera, V. (2011). *Sequential Analyses and Observational Methods for the Behavioural Sciences*. Cambridge: Cambridge University Press.

Barber, L. K., Grawitch, M. J., & Munz, D. C. (2012). Disengaging From a Task. *Journal of Individual Differences*, *33*(2), 76–82. https://doi.org/10.1027/1614-0001/a000064

Barron, K. E., & Harackiewicz, J. M. (2001). Achievement goals and optimal motivation: Testing multiple goal models. *Journal of Personality and Social Psychology*, *80*(5), 706–722. https://doi.org/10.1037/0022-3514.80.5.706

Bartels, J. M., & Magun-Jackson, S. (2009). Approach–avoidance motivation and metacognitive self-regulation: The role of need for achievement and fear of failure. *Learning and Individual Differences*, *19*(4), 459–463. https://doi.org/10.1016/j.lindif.2009.03.008

Bennett, T. R., & Flores, M. S. (1998). Help giving in achievement contexts: A developmental and cultural analysis of the effects of children's attributions and affects on their willingness to help. *Journal of Educational Psychology*, *90*(4), 659–669. https://doi.org/10.1037//0022-0663.90.4.659

Bernier, A., Carlson, S., & Whipple, N. (2010) From External Regulation to Self-Regulation: Early Parenting Precursors of Young Children' s Executive Functioning. *Child Development, 81*(1), 326-339. http://doi.org/10.1111/j.1467-8624.2009.01397.x

Bergman, M. M. (1998). A theoretical note on the differences between attitudes, opinions, and values. *Swiss Political Science Review*, *4*(2), 81–93. https://doi.org/10.1002/j.1662-6370.1998.tb00239.x

Berry, J. W., Poortinga, Y. H., Segall, M. H., & Dasen, P. R. (2002). *Cross-cultural psychology: Research and applications.* (2nd Ed.). Cambridge: Cambridge University Press. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2003-02471-000&site=ehost-live

Bielaczyc, K., & Pirolli, P. L. (1995). Training in Self-Explanation and Self-Regulation Strategies: Investigating the Effects of Knowledge Acquisition Activities on Problem Solving. *Cognition and Instruction*, *13*(2), 221–252. Retrieved from http://www.jstor.org/stable/3233714

Blay, J. A., & Ireson, J. (2009). Pedagogical beliefs, activity choice and structure, and adult-child interaction in nursery classrooms. *Teaching and Teacher Education*, *25*(8), 1105–1116. https://doi.org/10.1016/j.tate.2009.03.009

Blom, S., & Severiens, S. (2008). Engagement in self-regulated deep learning of successful immigrant and non-immigrant students in inner city schools. *European Journal of Psychology of Education*, *23*(1), 41–58. https://doi.org/10.1007/BF03173139

Bong, M. (2005). Within-Grade Changes in Korean Girls' Motivation and Perceptions of the Learning Environment Across Domains and Achievement Levels. *Journal of Educational Psychology*, *97*(4), 656–672. https://doi.org/10.1037/0022-0663.97.4.656

Bong, M. (2008). Effects of Parent-Child Relationships and Classroom Goal Structures on Motivation, Help-Seeking Avoidance, and Cheating. *The Journal of Experimental Education*, *76*(2), 191–217. https://doi.org/10.3200/JEXE.76.2.191.217

Bong, M. (2009). Age-Related Differences in Achievement Goal Differentiation. *Journal of Educational Psychology*, *101*(4), 879–896. https://doi.org/10.1037/a0015945

Bottge, B. A., Toland, M. D., Gassaway, L., Butler, M., Choo, S., Griffen, A. K., & Ma, X. (2015). Impact of Enhanced Anchored Instruction in Inclusive Math Classrooms. *Exceptional Children*, *81*(2), 158–175. https://doi.org/10.1177/0014402914551742

Boyatzis, R. E. (1998). Transforming qualitative information: Thematic analysis and code development. London: SAGE Publications. https://doi.org/10.1177/102831539700100211

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/http://dx.doi.org/10.1191/1478088706qp063oa

British Educational Research Association. (2011). *Ethical Guidelines For Educational Research*. Retrieved from https://www.bera.ac.uk/wp-content/uploads/2014/02/BERA-Ethical-Guidelines-2011.pdf?noredirect=1

Brown, R., Pressley, M., Van Meter, P., & Schuder, T. (1996). A quasi-experimental validation of transactional strategies instruction with low-achieving second-grade readers. *Journal of Educational Psychology*, *88*(1), 18–37. https://doi.org/10.1037/0022-0663.88.1.18

Bruner, J. (1996). *The culture of education*. Cambridge, Mass.: Harvard University Press.

Bryce, D., & Whitebread, D. (2012). The development of metacognitive skills: Evidence from observational analysis of young children's behavior during problem-solving. *Metacognition and Learning*, *7*, 197–217. https://doi.org/10.1007/s11409-012-9091-2

Bryce, D., Whitebread, D., & Szűcs, D. (2015). The relationships among executive functions, metacognitive skills and educational achievement in 5 and 7 year-old children. *Metacognition and Learning, 10*(2), 181-198. https://doi.org/10.1007/s11409-014-9120-4

Butler, R., & Neuman, O. (1995). Effects of Task and Ego Achievement Goals on Help-Seeking Behaviors and Attitudes. *Journal of Educational Psychology*, *87*(2), 261–271. https://doi.org/10.1037/022-0663.87.2.216

Butler, Y. G. (2015). Parental factors in children's motivation for learning English: a case in China. *Research Papers in Education*, *30*(2), 164–191. https://doi.org/10.1080/02671522.2014.891643

Byrd, D. L., Case, K. H., & Berg, W. K. (2011). Planning: Fixed-foreperiod event-related potentials during the Tower of London task. *Neuropsychologia*, *49*(5), 1024–1032. https://doi.org/10.1016/j.neuropsychologia.2011.02.025

Cadima, J., Verschueren, K., Leal, T., & Guedes, C. (2016). Classroom Interactions, Dyadic Teacher–Child Relationships, and Self–Regulation in Socially Disadvantaged Young Children. *Journal of Abnormal Child Psychology*, *44*(1), 7–17. https://doi.org/10.1007/s10802-015-0060-5

Cameron, C. E., & Morrison, F. J. (2011). Teacher Activity Orienting Predicts Preschoolers' Academic and Self-Regulatory Skills. *Early Education & Development*, *22*(4), 620–648. https://doi.org/10.1080/10409280903544405

Campbell, M. V. (1959). Education in Chile, 1810-1842. *Journal of Inter-American Studies, 1*(3), 353–357. https://doi.org/10.2307/164901

Capa, R. L., Audiffren, M., & Ragot, S. (2008). The interactive effect of achievement motivation and task difficulty on mental effort. *International Journal of Psychophysiology*, *70*(2), 144–150. https://doi.org/10.1016/j.ijpsycho.2008.06.007

Carey, K. B., Neal, D. J., & Collins, S. E. (2004). A psychometric analysis of the self-regulation questionnaire. *Addictive Behaviors*, *29*(2), 253–260. https://doi.org/10.1016/j.addbeh.2003.08.001

Carr, A., & Pike, A. (2012). Maternal scaffolding behavior: links with parenting style and maternal education. *Developmental Psychology*, *48*(2), 543–51. https://doi.org/10.1037/a0025888

Carr, M. (2010). The importance of metacognition for conceptual change and strategy use in mathematics. In H. S. Waters & W. Schneider (Eds.), *Metacognition, strategy use, and instruction* (pp. 176–197). New York: Guilford Press.

Cazalis, F., Valabrègue, R., Pélégrini-Issac, M., Asloun, S., Robbins, T. W., & Granon, S. (2003). Individual differences in prefrontal cortical activation on the Tower of London planning task: Implication for effortful processing. *European Journal of Neuroscience*, *17*(10), 2219–2225. https://doi.org/10.1046/j.1460-9568.2003.02633.x

Chan, A. M. (2009). Measuring Cross-Cultural Values: A Qualitative Approach. *International Review of Business Research Papers*, *5*(6), 322–337. Retrieved from http://www.bizresearchpapers.com/Alvin-edited[1].pdf

Chen, C. H., & Chiu, C. H. (2016). Collaboration Scripts for Enhancing Metacognitive Self-regulation and Mathematics Literacy. *International Journal of Science and Mathematics Education*, *14*(2), 263–280. https://doi.org/10.1007/s10763-015-9681-y

Chen, L. H., Wu, C. H., Kee, Y. H., Lin, M. S., & Shui, S. H. (2009). Fear of failure, 2 x 2 achievement goal and self-handicapping: An examination of the hierarchical model of achievement motivation in physical education. *Contemporary Educational Psychology*, *34*(4), 298–305. https://doi.org/10.1016/j.cedpsych.2009.06.006

Chen, S., Wang, H., Wei, C.-F., Fwu, B.-J., & Hwang, K. (2009). Taiwanese Students' Self-Attributions for Two Types of Achievement Goals. *The Journal of Social Psychology*, *149*(2), 179–193. https://doi.org/10.3200/SOCP.149.2.179-194

Chen, W.-W., & Wong, Y.-L. (2015). Chinese mindset: theories of intelligence, goal orientation and academic achievement in Hong Kong students. *Educational Psychology*, *35*(6), 714–725. https://doi.org/10.1080/01443410.2014.893559

Cho, M.-H., & Shen, D. (2013). Self-regulation in online learning. *Distance Education*, *34*(3), 290–301. https://doi.org/10.1080/01587919.2013.835770

Chouinard, R., Karsenti, T., & Roy, N. (2007). Relations among competence beliefs, utility value, achievement goals, and effort in mathematics. *British Journal of Educational Psychology*, *77*(3), 501–517. https://doi.org/10.1348/000709906X133589

Church, M. A., Elliot, A. J., & Gable, S. L. (2001). Perceptions of classroom environment, achievement goals,

and achievement outcomes. *Journal of Educational Psychology*, *93*(1), 43–54. https://doi.org/10.1037/0022-0663.93.1.43

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education*. New York: Routledge.

Cole, M. (1996). *Cultural Psychology: A once and future discipline*. Cambridge, MA: Harvard University Press.

Cole, M., & Gajdamaschko, N. (2007). Vygotsky and Culture. In H. Daniels, M. Cole, & J. Wertsch (Eds.), *The Cambridge Companion to Vygotsky* (pp. 193–211). Cambridge: Cambridge University Press.

Coltman, P., Warwick, J., Wilmott, J., Pino Pasternak, D., & Whitebread, D. (2013). Teachers co-constructing pedagogical practices to support children's exploratory talk and self-regulation: the Children Articulating Thinking (ChAT) project Penny. In D. Whitebread, N. Mercer, C. Howe, & A. Tolmie (Eds.), *Self-regulation and dialogue in the primary classrooms.* (pp. 127–146). Leicester: The British Psychological Society.

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4th Ed., Vol. 16). Thousand Oaks, CA: Sage. https://doi.org/http://dx.doi.org/10.1016/j.math.2010.09.003

Cury, F., Elliot, A. J., Da Fonseca, D., & Moller, A. C. (2006). The social-cognitive model of achievement motivation and the 2 x 2 achievement goal framework. *Journal of Personality and Social Psychology*, *90*(4), 666–679. https://doi.org/10.1037/0022-3514.90.4.666

Dandy, J., & Nettelbeck, T. (2002). The Relationship Between IQ, Homework, Aspirations and Academic Achievement for Chinese, Vietnamese and Anglo-Celtic Australian School Children. *Educational Psychology*, *22*(3), 267–275. https://doi.org/10.1080/01443410220138502

Darnon, C., Dompnier, B., Delmas, F., Pulfrey, C., & Butera, F. (2009). Achievement goal promotion at university: social desirability and social utility of mastery and performance goals. *Journal of Personality and Social Psychology*, *96*(1), 119–134. https://doi.org/10.1037/a0012824

Darnon, C., Dompnier, B., & Poortvliet, P. M. (2012). Achievement Goals in Educational Contexts: A Social Psychology Perspective. *Social and Personality Psychology Compass*, *6*(10), 760–771. https://doi.org/10.1111/j.1751-9004.2012.00457.x

Day, J. D., & Cordón, L. a. (1993). Static and dynamic measures of ability: An experimental comparison. *Journal of Educational Psychology*, *85*(1), 75–82. https://doi.org/10.1037/0022-0663.85.1.75

Day, S., & McDonald, C. (2017). Examining the relations between self-regulation and achievement in third-grade students. *Assessment for Effective Intervention*, *42*(2), 97–109. https://doi.org/10.1177/1534508416670367

De Backer, L., Van Keer, H., & Valcke, M. (2015a). Exploring evolutions in reciprocal peer tutoring groups' socially shared metacognitive regulation and identifying its metacognitive correlates. *Learning and Instruction*, *38*, 63–78. https://doi.org/10.1016/j.learninstruc.2015.04.001

De Backer, L., Van Keer, H., & Valcke, M. (2015b). Socially shared metacognitive regulation during reciprocal peer tutoring: identifying its relationship with students:Content processing and transactive discussions. *Instructional Science*, *43*(3), 323–344. https://doi.org/10.1007/s11251-014-9335-4

De Castella, K., Byrne, D., & Covington, M. (2013). Unmotivated or motivated to fail? A cross-cultural study of achievement motivation, fear of failure, and student disengagement. *Journal of Educational Psychology*, *105*(3), 861–880. https://doi.org/10.1037/a0032464

De Corte, E., & Verschaffel, L. (2007). Analyzing mathematics classroom cultures and practices. *International Journal of Educational Research*, *46*(5), 247–251. https://doi.org/10.1016/j.ijer.2007.10.006

Depaepe, F., De Corte, E., & Verschaffel, L. (2007). Unraveling the culture of the mathematics classroom: A video-based study in sixth grade. *International Journal of Educational Research*, *46*(5), 266–279. https://doi.org/10.1016/j.ijer.2007.10.008

Dermitzaki, I., & Kiosseoglou, G. (2004). Self-regulation during problem solving in second-graders: Relations with students' performance and goal orientations. *Hellenic Journal of Psychology*, *1*(1), 128–146. Retrieved from http://www.pseve.org/journal/UPLOAD/dermitzaki1b.pdf

Dermitzaki, I., Leondari, A., & Goudas, M. (2009). Relations between young students' strategic behaviours, domain-specific self-concept, and performance in a problem-solving situation. *Learning and*

Instruction, *19*(2), 144–157. https://doi.org/10.1016/j.learninstruc.2008.03.002

Derry, S. J. (2007). Video research in classroom and teacher learning (standardize that!). In R. Goldman, R. Pea, B. Barron, & S. Derry (Eds.), *Video Research in the Learning Sciences* (pp. 305–320). New Jersey: Lawrence Erlbaum.

Desoete, A., Roeyers, H., & De Clercq, A. (2003). Can offline metacognition enhance mathematical problem solving? *Journal of Educational Psychology*, *95*(1), 188–200. https://doi.org/10.1037/0022-0663.95.1.188

Dewey, J., & Bento, J. (2009). Activating children's thinking skills (ACTS): the effects of an infusion approach to teaching thinking in primary schools. *The British Journal of Educational Psychology*, *79*(2), 329–351. https://doi.org/10.1348/000709908X344754

Díaz, R., Neal, C., & Amaya-Williams, M. (1990). The social origins of self-regulation. In L. C. Moll (Ed.), *Vygotsky and Education. Instructional implications and applications of sociohistorical psychology* (pp. 127–154). Cambridge: Cambridge University Press.

Dickson, M., Gregg, P., Robinson, H., Dickson, M., Gregg, P., & Robinson, H. (2014). Early, Late or Never? When Does Parental Education Impact Child Outcomes? *The Economic Journal*, (126), 184–231. https://doi.org/10.1111/ecoj.12356

Dignath, C., Bütner, G., Langfeldt, H.-P., & Goethe, J. W. (2008). How can primary school students learn self-regulated learning strategies most effectively? *Educational Research Review*, *3*(2), 101–129. https://doi.org/10.1016/j.edurev.2008.02.003

Dignath, C., & Büttner, G. (2008). Components of fostering self-regulated learning among students. A meta-analysis on intervention studies at primary and secondary school level. *Metacognition and Learning*, *3*(3), 231–264. https://doi.org/10.1007/s11409-008-9029-x

Dinger, F. C., & Dickhä, O. (2013). Does implicit theory of intelligence cause achievement goals? Evidence from an experimental study. *International Journal of Educational Research*, *61*, 38–47. https://doi.org/10.1016/j.ijer.2013.03.008

Diseth, Å., Meland, E., & Breidablik, H. J. (2014). Self-beliefs among students: Grade level and gender differences in self-esteem, self-efficacy and implicit theories of intelligence. *Learning and Individual Differences*, *35*, 1–8. https://doi.org/10.1016/j.lindif.2014.06.003

Dopkins Stright, A., & Supplee, L. H. (2002). Children's Self-Regulatory Behaviors During Teacher-Directed, Seat-Work, and Small-Group Instructional Contexts. *The Journal of Educational Research*, *95*(4), 235–244. https://doi.org/10.1080/00220670209596596

Dowson, M., & McInerney, D. M. (2003). What do students say about their motivational goals?: Towards a more complex and dynamic perspective on student motivation. *Contemporary Educational Psychology*, *28*, 91–113. Retrieved from www.elsevier.com/locate/cedpsych

Duckworth, K., & Sabates, R. (2005). Effects of mothers' education on parenting: an investigation across three generations. *London Review of Education*, *3*(3), 239–264. https://doi.org/10.1080/14748460500372481

Dull, R. B., Schleifer, L. L. F., & McMillan, J. J. (2015). Achievement Goal Theory: The Relationship of Accounting Students' Goal Orientations with Self-efficacy, Anxiety, and Achievement. *Accounting Education*, *24*(2), 152–174. https://doi.org/10.1080/09639284.2015.1036892

Dunn, K. E., Lo, W.-J., Mulvenon, S. W., & Sutcliffe, R. (2012). Revisiting the Motivated Strategies for Learning Questionnaire: A Theoretical and Statistical Reevaluation of the Metacognitive Self-Regulation and Effort Regulation Subscales. *Educational and Psychological Measurement*, *72*(2), 312–331. https://doi.org/10.1177/0013164411413461

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, *95*(2), 256–273. https://doi.org/10.1037/0033-295X.95.2.256

Ehrlinger, J., Mitchum, A. L., & Dweck, C. S. (2016). Understanding overconfidence: Theories of intelligence, preferential attention, and distorted self-assessment ☆. *Journal of Experimental Psychology*, *63*, 94–100. https://doi.org/10.1016/j.jesp.2015.11.001

Elliot, A. J., Chirkov, V. I., Kim, Y., & Sheldon, K. M. (2001). A Cross-Cultural Analysis of Avoidance (Relative to Approach) Personal Goals. *Psychological Review*, *12*(6), 505–510. https://doi.org/10.111/1467-9280.00393

Elliot, A. J., Sedikides, C., Murayama, K., Tanaka, A., Thrash, T. M., & Mapes, R. R. (2012). Cross-cultural generality and specificity in self-regulation: avoidance personal goals and multiple aspects of well-being in the United States and Japan. *Emotion*, *12*(5), 1031–40. https://doi.org/10.1037/a0027456

Elliot, A. J., & Thrash, T. M. (2001). Achievement Goals and the Hierarchical Model of Achievement Motivation. *Educational Psychology Review*, *13*(2), 139–156. https://doi.org/10.1023/A:1009057102306

Epstein, J. L. (1989). Family structures and student motivation. In R. E. Ames & C. Ames (Eds.), *Research on motivation in education: Vol. 3. Goals and cognitions.* (pp. 259–295). New York: Academic Press.

Eshel, Y., & Kohavi, R. (2003). Perceived Classroom Control, Self-Regulated Learning Strategies, and Academic Achievement. *Educational Psychology*, *23*(3), 249–260. https://doi.org/10.1080/0144341032000060093

Extremera, A. B., Ruiz, J. F., Granero-Gallegos, A., Science, S., & Santiago, M. (2016). A Cross-Cultural Analysis in Predicting 2X2 Achievement Goals in Physical Education Based on Social Goals, Perceived Locus of Causality and Casual Attribution. *Studia Psychologica*, *58*(1), 74–89. https://doi.org/10.21909/SP.2016.01.708

Fabrigar, L. R., & Wegener, D. T. (2012). *Exploratory factor analysis*. Oxford: Oxford University Press.

Federici, R. A., Skaalvik, E. M., & Tangen, T. N. (2015). Students' Perceptions of the Goal Structure in Mathematics Classrooms: Relations with Goal Orientations , Mathematics Anxiety, and Help-Seeking Behaviour. *International Education Studies*, *8*(3), 146–158. https://doi.org/10.5539/ies.v8n3p146

Fidalgo, R., Torrance, M., Rijlaarsdam, G., van den Bergh, H., & Álvarez, M. L. (2015). Strategy-focused writing instruction: Just observing and reflecting on a model benefits 6th grade students. *Contemporary Educational Psychology*, *41*(1), 37–50. https://doi.org/10.1016/j.cedpsych.2014.11.004

Field, A. P. (2009). *Discovering statistics using SPSS* (Third Ed.). Thousand Oaks, CA: Sage.

Flavell, J. H. (1979). Metacognition and Cognitive Monitoring A New Area of Cognitive—Developmental Inquiry. *The American Psychologist*, *34*(10), 906–911. https://doi.org/10.1037/0003-066X.34.10.906

Fleer, M., & Hedegaard, M. (2010). Children's Development as Participation in Everyday Practices across Different Institutions. *Mind, Culture, and Activity*, *17*(2), 149–168. https://doi.org/10.1080/10749030903222760

Flick, U. (2007). *Designing Qualitative Research*. London: Sage. https://doi.org/10.4135/9781849208826

Flora, D. B., & Curran, P. J. (2004). An empirical evaluation of alternative methods of estimation for confirmatory factor analysis with ordinal data. *Psychological Methods*, *9*(4), 466–91. https://doi.org/10.1037/1082-989X.9.4.466

Forman, E. A., Minick, N., & Stone, C. A. (1993). *Contexts for learning: Sociocultural dynamics in children's development*. *Contexts for learning: Sociocultural dynamics in children's development*. Oxford: Oxford University Press.

Frenzel, A. C., Pekrun, R., & Goetz, T. (2007). Perceived learning environment and students' emotional experiences: A multilevel analysis of mathematics classrooms. *Learning and Instruction*, *17*(5), 478–493. https://doi.org/10.1016/j.learninstruc.2007.09.001

Fryer, J., & Elliot, A. J. (2008). Self-regulation of achievement goal pursuit. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and Self-Regulated Learning. Theory, Research, and Applications.* (pp. 53–75). New York: Routledge.

Fuchs, L. S., Fuchs, D., Prentice, K., Burch, M., Hamlett, C. L., Owen, R., & Schroeter, K. (2003). Enhancing third-grade student' mathematical problem solving with self-regulated learning strategies. *Journal of Educational Psychology*, *95*(2), 306–315. https://doi.org/10.1037/0022-0663.95.2.306

Fuhs, M. W., Farran, D. C., & Nesbitt, K. T. (2013). Preschool classroom processes as predictors of children's cognitive self-regulation skills development. *School Psychology Quarterly : The Official Journal of the Division of School Psychology, American Psychological Association*, *28*(4), 347–59. https://doi.org/10.1037/spq0000031

Gaeta, M. L., Teruel, M. P., Orejudo, S. (2012). Motivational, volitional and metacognitive aspects of self regulated learning. *Electronic Journal of Research in Educational Psychology*, *10*(26), 73–94.

Retrieved from http://www.investigacion-psicopedagogica.org/revista/new/english/ContadorArticulo.php?640

Gallimore, R., & Tharp, R. (1990). Teaching mind in society: Teaching, schooling, and literate discourse. In L. C. Moll (Ed.), *Vygotsky and Education. Instructional implications and applications of sociohistorical psychology* (pp. 175–205). Cambridge: Cambridge University Press.

Galton, M., Hargreaves, L., Comber, C., Wall, D., & Pell, A. (1999). *Inside the Primary Classroom: 20 Years On*. London: Routledge.

Gao, Z. A. N., Xiang, P., Harrison, L., Guan, J., & Rao, Y. (2008). A cross-cultural analysis of achievement goals and self-efficacy between American and Chinese College students in Physical Education. *International Journal of Sport Psychology*, *39*(4), 312–328. Retrieved from www.ijsp-online.com

Gaudreau, P., Carraro, N., & Miranda, D. (2012). From goal motivation to goal progress: the mediating role of coping in the Self-Concordance Model. *Anxiety, Stress & Coping*, *25*(5), 507–528. https://doi.org/10.1080/10615806.2011.628015

Georgiou, S. N. (1999). Parental attributions as predictors of involvement and influences on child achievement. *The British Journal of Educational Psychology*, *69*(3), 409–429. https://doi.org/10.1348/000709999157806

Gestsdottir, S., Geldhof, G. J., Paus, T., Freund, A. M., Adalbjarnardottir, S., Lerner, J. V, & Lerner, R. M. (2015). Self-regulation among youth in four Western cultures: Is there an adolescence-specific structure of the Selection-Optimization-Compensation (SOC) model? *International Journal of Behavioral Development*, *39*(4), 346–358. https://doi.org/10.1177/0165025414542712

Gilbert, N. (2008). *Researching social life* (3rd ed.). Los Angeles: SAGE Publications.

Gillies, R. M., & Boyle, M. (2006). Ten Australian Elementary Teachers' Discourse and Reported Pedagogical Practices during Cooperative Learning. *The Elementary School Journal*, *106*(5), 429–452. https://doi.org/10.1086/505439

Gonzalez-DeHass, A. R., Willems, P. P., & Holbein, M. F. D. (2005). Examining the Relationship Between Parental Involvement and Student Motivation. *Educational Psychology Review*, *17*(2), 99–123. https://doi.org/10.1007/s10648-005-3949-7

Gore, J. S., Cross, S. E., & Kanagawa, C. (2009). Acting in our interests: Relational self-construal and goal motivation across cultures. *Motivation and Emotion*, *33*(1), 75–87. https://doi.org/10.1007/s11031-008-9113-1

Graham, S. (1991). A Review of Attribution Theory in Achievement Contexts. *Educational Psycology Review*, *3*(1), 5–39. https://doi.org/10.1007/BF01323661

Graham, S., & Williams, C. (2009). An Attributional Approach to Motivation in School. In A. Wigfield & K. Wenzel (Eds.), *Handbook of Motivation at School* (pp. 11–33). New York: Routledge.

Grau, V., & Whitebread, D. (2012). Self and social regulation of learning during collaborative activities in the classroom: The interplay of individual and group cognition. *Learning and Instruction*, *22*(6), 401–412. https://doi.org/10.1016/j.learninstruc.2012.03.003

Greene, J. A., Robertson, J., & Costa, L.-J. C. (2011). Assessing Self-Regulated Learning Using Think-Aloud Methods. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of Self-Regulation of Learning and Performance* (pp. 313–328). New York: Routledge. Retrieved from http://www.routledgehandbooks.com/doi/10.4324/9780203839010.ch20

Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in Children's Learning: An Experimental and Individual Difference Investigation. *Journal of Personality and Social Psychology*, *52*(5), 890–898. https://doi.org/10.1037/0022-3514.52.5.890

Guay, F. (2016). The virtue of culture in understanding motivation at school: Commentary on the special issue on culture and motivation. *British Journal of Educational Psychology*, *86*(1), 154–160. https://doi.org/10.1111/bjep.12105

Guthrie, J. T. (1996). Educational contexts for engagement in literacy. *The Reading Teacher*, *49*(6), 431–445. Retrieved from http://ila.onlinelibrary.wiley.com/hub/journal/10.1002/(ISSN)1936-2714/

Guthrie, J. T., & Klauda, S. L. (2014). Effects of Classroom Practices on Reading Comprehension, Engagement, and Motivations for Adolescents. *Reading Research Quarterly*, *49*(4), 387–416. https://doi.org/10.1002/rrq.81

Gwet, K. L. (2014). *Handbook of inter-rater reliability: The definitive guide to measuring the extent of agreement among raters* (4th ed). Gaithersburg, MD: Advanced Analytics.

Göncü, A. (1999). Children's and Researchers' Engagement in the world. In A. Göncü (Ed.), *Children engagement in the world: Sociocultural perspectives* (pp. 3–22). Cambridge: Cambridge University Press.

Hacker, D. J. (1998). Metacognition: Definitions and empirical foundations. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 1–23). Mahwah, NJ: Erlbaum.

Hacker, D. J., Keener, M. C., & Kircher, J. C. (2009). Writing is applied metacognition. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 154–172). New York: Routledge.

Hadwin, A. F., Järvelä, S., & Miller, M. (2011). Self-regulated, co-regulated, and socially-shared regulation of learning. In B. J. Zimmeran & D. H. Shunk (Eds.), *Educational Psychology Handbook Series: Handbook of Self-regulation of learning and performance.* (pp. 65–84). New York: Routledge.

Hadwin, A. F., Wozney, L., & Pontin, O. (2005). Scaffolding the appropriation of self-regulatory activity: A socio-cultural analysis of changes in teacher-student discourse about a graduate research portfolio. *Instructional Science*, *33*(5–6), 413–450. https://doi.org/10.1007/s11251-005-1274-7

Hadwin, A., & Järvelä, S. (2011). Introduction to a Special Issue on Social Aspects of Self-Regulated Learning: Where Social and Self Meet in the Strategic Regulation of Learning. *Teachers College Record*, *113*(2), 235–239.

Hadwin, A., Järvelä, S., & Miller, M. (2011). Self-Regulated, Co-Regulated, and Socially Shared Regulation of Learning. In D. H. Schunk & B. Zimmerman (Eds.), *Handbook of Self-regulation of learning and performance* (pp. 65–84). New York: Routledge.

Hannon, B. (2015). Hispanics' SAT Scores: The Influences of Level of Parental Education, Performance-Avoidance Goals, and Knowledge About Learning. *Hispanic Journal of Behavioral Sciences*, *37*(2), 204–222. https://doi.org/10.1177/0739986315573249

Hao, S., & Johnson, R. L. (2013). Teachers' classroom assessment practices and fourth-graders' reading literacy achievements: An international study. *Teaching and Teacher Education*, *29*, 53–63. https://doi.org/10.1016/j.tate.2012.08.010

Hargreaves, L., Pell, A., & Merry, R. (2003). Teacher pupil interaction and the interactive teaching. Is there a difference in practice? In J. Moyles, L. Hargreaves, R. Merry, F. Paterson, & V. Esarte-Sarries (Eds.), *Interactive teaching in the primary classroom: Diggin deeper into meanings.* (pp. 101–123). Midenhead: Open University Press.

Harris, A., Yuill, N., & Luckin, R. (2008). The influence of context-specific and dispositional achievement goals on children's paired collaborative interaction. *British Journal of Educational Psychology*, *78*(3), 355–374. https://doi.org/10.1348/000709907X267067

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. New York: Routledge.

Hattie, J., & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research*, *77*(1), 81–112. https://doi.org/10.3102/003465430298487

Hau, K., & Salili, F. (1990). Examination result attribution, expectancy and achievement goals among Chinese students in Hong Kong. *Educational Studies*, *16*(1), 17–31. https://doi.org/10.1080/0305569900160102

Hayashi, C. T., & Weiss, M. R. (1994). A cross-cultural analysis of achievement motivation in Anglo and Japanese marathon runners. *International Journal of Sport Psychology*, *25*, 187–202. Retrieved from www.ijsp-online.com

Hayes, A., & Krippendorff, K. (2007). Answering the Call for a Standard Reliability Measure for Coding Data. *Communication Methods and Measures*, *1*(1). https://doi.org/http://dx.doi.org/10.1080/19312450709336664

Hedegaard, M. (2012). The dynamic aspects in children's learning and development. In M. Hedegaard, A. Edwards, & M. Fleer (Eds.), *Motives in Children's Development: Cultural-Historical Approaches* (pp. 9–27). Cambridge: Cambridge University Press.

Hendy, L., & Whitebread, D. (2000). Interpretations of Independent Learning in the Early Years. *International Journal of Early Years Education*, *8*(3), 243–252. https://doi.org/10.1080/09669760050156785

Hinnant-Crawford, B. N., Faison, M. Z., & Chang, M.-L. (2016). Culture as mediator. *Journal for Multicultural Education*, *10*(3), 274–293. https://doi.org/10.1108/JME-05-2016-0032

Hitchcock, G., & Hughes, D. (1995). *Research and the teacher: A qualitative introduction to school-based research*. New York: Routledge.

Hobbs, G., & Vignoles, A. (2010). Is children's free school meal "eligibility" a good proxy for family income? *British Educational Research Journal*, *36*(4), 673–690. https://doi.org/http://dx.doi.org/10.1080/01411920903083111

Hofmann, W., Schmeichel, B. J, Baddeley, A. D (2012). Executive functions and self-regulation. *Trends in Cognitive Sciences, 16*(3), 174-180. http://dx.doi.org/10.1016/j.tics.2012.01.006

Hofstede, G. (2017). Culture compass. Retrieved October 4, 2017, from https://www.hofstede-insights.com/product/compare-countries/

Hong, Y., Chiu, C., Dweck, C. S., Lin, D. M.-S., & Wan, W. (1999). Implicit theories, attributions, and coping: A meaning system approach. *Journal of Personality and Social Psychology*, *77*(3), 588–599. https://doi.org/10.1037/0022-3514.77.3.588

Hong, Y. Y. (2001). Chinese students' and teachers' inferences of effort and ability. In C. Y. Chiu & F. Salili (Eds.), *Student Motivation: The Culture and Context of Learning* (pp. 105–120). New York: Kluwer Academic.

Horowitz, G. (2010). It's Not Always Just About the Grade: Exploring the Achievement Goal Orientations of Pre-Med Students. *The Journal of Experimental Education*, *78*(2), 215–245. https://doi.org/10.1080/00220970903352746

Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression.* (3rd ed.). New Jersey: Wiley.

Howe, C. (2010). Peer dialogue and cognitive development: A two-way relationship? In K. Littleton & C. Howe (Eds.), *Educational dialogues: Understanding and promoting productive interaction* (pp. 32–47). New York: Routledge.

Howe, C. (2013). Dialogue and self-regulation in the primary classroom: concluding comments. In D. Whitebread, N. Mercer, C. Howe, & A. Tolmie (Eds.), *Self-regulation and dialogue in primary classrooms* (pp. 147–156). Leicester: The British Psychological Society.

Hox, J. J. (2010). *Multilevel analysis: Techniques and applications*. New York: Routledge.

Huang, C. (2012). Discriminant and criterion-related validity of achievement goals in predicting academic achievement: A meta-analysis. *Journal of Educational Psychology*, *104*(1), 48–73. https://doi.org/10.1037/a0026223

Hulleman, C. S., Schrager, S. M., Bodmann, S. M., & Harackiewicz, J. M. (2010). A meta-analytic review of achievement goal measures: Different labels for the same constructs or different constructs with similar labels? *Psychological Bulletin*, *136*(3), 422–449. https://doi.org/10.1037/a0018947

Hurme, T.-R., Merenluoto, K., & Järvelä, S. (2009). Socially shared metacognition of pre-service primary teachers in a computer-supported mathematics course and their feelings of task difficulty: a case study. *Educational Research and Evaluation*, *15*(5), 503–524. https://doi.org/10.1080/13803610903444659

Huston-Stein, A., Friedrich-Cofer, L., & Susman, E. (1977). The Relation of Classroom Structure to Social Behavior, Imaginative Play , and Self- Regulation of Economically Disadvantaged Children. *Child Development*, *48*(3), 908–916. Retrieved from http://www.jstor.org/stable/1128340

Iiskala, T., Vauras, M., Lehtinen, E., & Salonen, P. (2011). Socially shared metacognition of dyads of pupils in collaborative mathematical problem-solving processes. *Learning and Instruction*, *21*(3), 379–393. https://doi.org/10.1016/j.learninstruc.2010.05.002

Iiskala, T., Volet, S., Lehtinen, E., & Vauras, M. (2015). Socially Shared Metacognitive Regulation in Asynchronous CSCL in Science: Functions , Evolution and Participation. *Frontline Learning Research*, *3*(1), 78–111. https://doi.org/10.14786/flr.v3il.159

Inglehart, R., & Welzel, C. (2005). *Modernization, Cultural Change and Democracy*. Cambridge: Cambridge

University Press.

Isogai, H., Brewer, B. W., Cornelius, A. E., Etnier, J., & Tokunaga, M. (2003). A cross-cultural analysis of goal orientation in American and Japanese physical education students. *International Journal of Sport Psychology*, *34*(1), 80–93. Retrieved from www.ijsp-online.com

Jang, H., Reeve, J., & Deci, E. L. (2010). Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure. *Journal of Educational Psychology*, *102*(3), 588–600. https://doi.org/10.1037/a0019682

Jaramillo, J. M., Rendón, M. I., Muñoz, L., Weis, M., & Trommsdorff, G. (2017). Children's Self-Regulation in Cultural Contexts: The Role of Parental Socialization Theories, Goals, and Practices. *Frontiers in Psychology*, *8*(923), 1–9. https://doi.org/10.3389/fpsyg.2017.00923

Järvelä, S. (2015). El papel de la investigación sobre aprendizaje autorregulado en el desarrollo del aprendizaje colaborativo asistido por ordenador. *Infancia Y Aprendizaje*, *38*(2), 279–294. https://doi.org/10.1080/02103702.2015.1016747

Järvelä, S., & Järvenoja, H. (2011). Socially Constructed Self-Regulated Learning and Motivation Regulation in Collaborative Learning Groups. *Teachers College Record*, *113*(2), 350–374. Retrieved from http://www.tcrecord.org/

Järvelä, S., Järvenoja, H., & Malmberg, J. (2012). How elementary school students' motivation is connected to self-regulation. *Educational Research and Evaluation*, *18*(1), 65–84. https://doi.org/10.1080/13803611.2011.641269

Järvelä, S., & Salovaara, H. (2004). The interplay of motivational goals and cognitive strategies in a new pedagogical culture: A context-oriented and qualitative approach. *European Psychologist*, *9*(4), 232–244. https://doi.org/10.1027/1016-9040.9.4.232

Järvelä, S., Volet, S., & Järvenoja, H. (2010). Research on Motivation in Collaborative Learning: Moving Beyond the Cognitive–Situative Divide and Combining Individual and Social Processes. *Educational Psychologist*, *45*(1), 15–27. https://doi.org/10.1080/00461520903433539

Järvenoja, H., Järvelä, S., & Malmberg, J. (2015). Understanding Regulated Learning in Situative and Contextual Frameworks. *Educational Psychologist*, *50*(3), 204–219. https://doi.org/10.1080/00461520.2015.1075400

Jenkins, S. P., Micklewright, J., Schnepf, S. V, Jenkinsa, S. P., Micklewrightb, J., & Schnepfb, S. V. (2008). Social Segregation in Secondary Schools: How Does England Compare with Other Countries? Oxford Review of Education Routledge Social segregation in secondary schools: how does England compare with other countries? *Source: Oxford Review of Education*, *34*(1), 21–37. https://doi.org/10.1080/03054980701542039

Jupp, V. (2006). *The SAGE Dictionary of Social Research Methods*. London: Sage. https://doi.org/10.4135/9780857020116

Kain, J., Uauy, R., & Taibo, M. (2002). Chile's school feeding programme: Targeting experience. *Nutrition Research*, *22*(5), 599–608. https://doi.org/10.1016/S0271-5317(01)00377-3

Kaller, C. P., Rahm, B., Bolkenius, K., & Unterrainer, J. M. (2009). Eye movements and visuospatial problem solving: Identifying separable phases of complex cognition. *Psychophysiology*, *46*(4), 818–830. https://doi.org/10.1111/j.1469-8986.2009.00821.x

Kaplan, A., Lichtinger, E., & Gorodetsky, M. (2009). Achievement goal orientations and self-regulation in writing: An integrative perspective. *Journal of Educational Psychology*, *101*(1), 51–69. https://doi.org/10.1037/a0013200

Kaplan, A., Lichtinger, E., & Margulis, M. (2011). The situated dynamics of purposes of engagement and self-regulation strategies: A mixed-methods case study of writing. *Teachers College Record*, *113*(2), 284–324. Retrieved from http://www.tcrecord.org/

Kelly, P., Dorf, H., Pratt, N., & Hohmann, U. (2014). Comparing teacher roles in Denmark and England. *Compare*, *44*(4), 566–586. https://doi.org/10.1080/03057925.2013.800786

Kim, J.-I., Schallert, D. L., & Kim, M. (2010). An integrative cultural view of achievement motivation: Parental and classroom predictors of children's goal orientations when learning mathematics in Korea. *Journal of Educational Psychology*, *102*(2), 418–437. https://doi.org/10.1037/a0018676

Kim, J.-O., & Muller, C. W. (1978). *Factor Analysis: Statistical Methods and Practical Issues*. London: Sage.

King, N., & Horrocks, C. (2010). *Interviews in qualitative research*. London: Sage.

King, R. B. (2016). Is a performance-avoidance achievement goal always maladaptive? Not necessarily for collectivists. *Personality and Individual Differences*, *99*, 190–195. https://doi.org/10.1016/j.paid.2016.04.093

King, R. B., Ganotice, F. A., & Watkins, D. A. (2014). A cross-cultural analysis of achievement and social goals among Chinese and Filipino students. *Social Psychology of Education*, *17*(3), 439–455. https://doi.org/10.1007/s11218-014-9251-0

King, R. B., Mcinerney, D. M., & Watkins, D. A. (2012). Competitiveness is not that bad…at least in the East: Testing the hierarchical model of achievement motivation in the Asian setting. *International Journal of Intercultural Relations*, *36*(3), 446–457. https://doi.org/10.1016/j.ijintrel.2011.10.003

Kitayama, S. (2002). Culture and basic psychological processes--toward a system view of culture: comment on Oyserman et al. (2002). *Psychological Bulletin*, *128*(1), 89–96. https://doi.org/10.1037/0033-2909.128.1.89

Kitchen, S., Tanner, E., Brown, V., Payne, C., Crawford, C., Dearden, L., … Purdon, B. (2013). *Evaluation of the free school meals pilot. Impact Report. Research Report DFE-RR227.* London.

Kleitman, S., & Stankov, L. (2007). Self-confidence and metacognitive processes. *Learning and Individual Differences*, *17*(2), 161–173. https://doi.org/10.1016/j.lindif.2007.03.004

Komarraju, M., & Nadler, D. (2013). Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter? *Learning and Individual Differences*, *25*, 67–72. https://doi.org/10.1016/j.lindif.2013.01.005

Kozulin, A. (1998). *Psychological Tools: A sociocultural approach to education*. London: Harvard University Press.

Lagos San Martín, G., Ingles Saura, C., Ossa Cornejo, C., Gonzalvez-Marcia, C., Vincent-Juan, M., & Garcia-Fernandez, J. (2016). Relationship between attribution of success and failure and school anxiety in Chilean students of secondary education. *Psicologia Desde El Caribe*, *33*(2), 146–157. https://doi.org/10.14482/psdc.33.2.7296

Larkin, S. (2010). *Metacognition in Young Children*. London: Routledge.

Lau, K.-L., & Chan, D. W. (2001). Motivational Characteristics of Under-achievers in Hong Kong. *Educational Psychology*, *21*(4), 417–430. https://doi.org/10.1080/01443410120090803

Lau, K., & Chen, X. (2013). Perception of Reading Instruction and Self-Regulated Learning: A Comparison between Chinese Students in Hong Kong and Beijing. *Instructional Science: An International Journal of the Learning Sciences*, *41*(6), 1083–1101. https://doi.org/10.1007/s11251-013-9265-6

Lau, S., & Nie, Y. (2008). Interplay between personal goals and classroom goal structures in predicting student outcomes: A multilevel analysis of person-context interactions. *Journal of Educational Psychology*, *100*(1), 15–29. https://doi.org/10.1037/0022-0663.100.1.15

Lave, J. (1988). *Cognition in practice*. Cambridge: Cambridge University Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Lawrenz, F., Huffman, D., & Robey, J. (2003). Relationships among student, teacher and observer perceptions of science classrooms and student achievement. *International Journal of Science Education*, *25*(3), 409–420. https://doi.org/10.1080/09500690210145800

Lee, C., Tinsley, C., & Bobko, P. (2003). Cross-cultural variance in goal orientations and their effects. *Applied Psychology*, *52*(2), 272–297. https://doi.org/10.1111/1464-0597.00135

Leont'ev, A. (1978). *Activity, Consciosness, and Personality*. Englewood Cliffs: Prentice-Hall.

Lewis-Beck, M. S., Bryman, A., & Futing Liao, T. (2004). *The SAGE encyclopedia of social science research methods*. Thousand Oaks, CA: Sage.

Liem, G. A. D. (2016). Academic and social achievement goals: Their additive, interactive, and specialized effects on school functioning. *British Journal of Educational Psychology*, *86*(1), 37–56. https://doi.org/10.1111/bjep.12085

Liem, G. A. D., Martin, A. J., Porter, A. L., & Colmar, S. (2012). Sociocultural antecedents of academic motivation and achievement: Role of values and achievement motives in achievement goals and

academic performance. *Asian Journal of Social Psychology*, *15*(1), 1–13. https://doi.org/10.1111/j.1467-839X.2011.01351.x

Lin, M.-C., & Hsieh, P.-J. (2015). The role of research-article writing motivation and self-regulatory strategies in explaining research- article abstract writing ability. *Perceptual & Motor Skills: Learning & Memory*, *120*(2), 397–415. https://doi.org/http://10.2466/50.PMS.120v17x9

Lin, X., & Lehman, J. D. (1999). Supporting Learning of Variable Control in a Computer-Based Biology Environment: Effects of Prompting College Students to Reflect on Their Own Thinking. *Journal of Research in Science Teaching*, *36*(7), 837–858. https://doi.org/10.1002/(SICI)1098-2736(199909)36:7<837::AID-TEA6>3.0.CO;2-U

Linnenbrink-Garcia, L., Tyson, D. F., & Patall, E. A. (2008). When are achievement goal orientations beneficial for academic achievement? A closer look at main effects and moderating factors. *Revue Internationale de Psychologie Sociale*, *21*(1), 19–70. Retrieved from www.cairn.info/revue-internationale-de-psychologie-sociale.htm

Linnenbrink, E. a. (2005). The Dilemma of Performance-Approach Goals: The Use of Multiple Goal Contexts to Promote Students' Motivation and Learning. *Journal of Educational Psychology*, *97*(2), 197–213. https://doi.org/10.1037/0022-0663.97.2.197

Littleton, K., & Mercer, N. (2013). *Interthinking: Putting talk to work*. Oxon: Routledge.

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, *57*(9), 705–717. https://doi.org/10.1037//0003-066X.57.9.705

Lu, L., Gilmour, R., & Kao, S.-F. (2001). Cultural Values and Happiness: An East-West Dialogue. *The Journal of Social Psychology*, *141*(4), 477–493. https://doi.org/10.1080/00224540109600566

Lumma-Sellenthin, A. (2012). Medical students' attitudes towards group and self-regulated learning. *International Journal of Medical Education*, *3*(3), 46–5646. https://doi.org/10.5116/ijme.4f4a.0435

Luo, W., Hogan, D. J., Yeung, A. S., Sheng, Y. Z., & Aye, K. M. (2014). Attributional beliefs of Singapore students: relations to self-construal, competence and achievement goals. *Educational Psychology*, *34*(2), 154–170. https://doi.org/10.1080/01443410.2013.785056

Luria, A. (1981). *Language and Cognition*. (J. Wertsch, Ed.). Washington: Wiley.

Mädamürk, K., Kikas, E., & Palu, A. (2016). Developmental trajectories of calculation and word problem solving from third to fifth grade. *Learning and Individual Differences*, *49*, 151–161. https://doi.org/10.1016/j.lindif.2016.06.007

Madero, C., & Madero, I. (2012). Educación escolar católica en Chile, ¿quién elige a quién? Un análisis de la elección de escuela y la selección de estudiantes en el sistema educativo chileno. In *3er Encuentro Anual de la Sociedad Chilean de Políticas Públicas.* Santiago. Retrieved from http://www.sociedadpoliticaspublicas.cl/archivos/BLOQUEM/Educacion_Escolar/EducacionEscolarCatolica-en_Chile_ Quien_eligeaquien.pdf

Magnuson, R. (1984). Gallicism, Anglo-Saxonism and Quebec Education. *Canadian Journal of Education*, *9*(1), 1–13. https://doi.org/10.2307/1494446

Malmberg, J., Järvelä, S., & Järvenoja, H. (2017). Capturing temporal and sequential patterns of self- , co- , and socially shared regulation in the context of collaborative learning. *Contemporary Educational Psychology*, *49*, 160–174. https://doi.org/10.1016/j.cedpsych.2017.01.009

Marambe, K. N., Vermunt, J. D., & Boshuizen, H. P. a. (2012). A cross-cultural comparison of student learning patterns in higher education. *Higher Education*, *64*(3), 299–316. https://doi.org/10.1007/s10734-011-9494-z

Marchand, G., & Skinner, E. A. (2007). Motivational dynamics of children's academic help-seeking and concealment. *Journal of Educational Psychology*, *99*(1), 65–82. https://doi.org/10.1037/0022-0663.99.1.65

Markie, P. (2017). Rationalism vs. Empiricism. In *The Stanford Encyclopedia of Philosophy* (Fall 2017). Retrieved from https://plato.stanford.edu/entries/rationalism-empiricism/

Marks, G. N. (2015). The size, stability, and consistency of school effects: evidence from Victoria. *School Effectiveness and School Improvement*, *26*(3), 397–414. https://doi.org/10.1080/09243453.2014.964264

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*(2), 224–253. https://doi.org/10.1037/0033-295X.98.2.224

Martínez-Fernández, J. R., & Vermunt, J. D. (2015). A cross-cultural analysis of the patterns of learning and academic performance of Spanish and Latin-American undergraduates. *Studies in Higher Education*, *40*(2), 278–295. https://doi.org/10.1080/03075079.2013.823934

Martinic, S., Vergara, C., & Huepe, D. (2013). The use of time and interactions in the classroom. A case study in Chile. *Pro-Posições*, *24*(1), 123–135. Retrieved from http://www.scielo.br/pdf/pp/v24n1/v24n1a09.pdf

Massey, D. (2009). Self-regulated comprehension. In S. E. Israel & G. G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 389–399). London: Routledge.

McCaslin, M. (2009). Co-Regulation of Student Motivation and Emergent Identity. *Educational Psychologist*, *44*(2), 137–146. https://doi.org/10.1080/00461520902832384

McCaslin, M., & Burross, H. L. (2011). Research on individual differences within a sociocultural perspective: Co-regulation and adaptive learning. *Teachers College Record*, *113*(2), 325–349. Retrieved from www.tcrecord.org/

McDonald Connor, C., Cameron Ponitz, C., Phillips, B. M., Travis, Q. M., Glasney, S., & Morrison, F. J. (2010). First graders' literacy and self-regulation gains: The effect of individualizing student instruction. *Journal of School Psychology*, *48*(5), 433–455. https://doi.org/10.1016/j.jsp.2010.06.003

McInerney, D. M. (2011). Culture and self-regulation in educational contexts: Assessing the relationship of cultural group to self-regulation. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 442–464). New York: Routledge.

McLellan, R. (2006). The Impact of Motivational "World-view" on Engagement in a Cognitive Acceleration Programme. *International Journal of Science Education*, *28*(7), 781–819. https://doi.org/10.1080/09500690600621050

Meece, J. L., Anderman, E. M., & Anderman, L. H. (2006). Classroom Goal Structure, Student Motivation, and Academic Achievement. *Annual Review of Psychology*, *57*(1), 487–503. https://doi.org/10.1146/annurev.psych.56.091103.070258

Meissel, K., & Rubie-Davies, C. (2016). Cultural invariance of goal orientation and self-efficacy in New Zealand: Relations with achievement. *British Journal of Educational Psychology*, *86*(1), 92–111. https://doi.org/10.1111/bjep.12103

Mentz, E., & Van Zyl, S. (2016). Introducing cooperative learning: students' attitudes towards learning and the implications for self-directed learning. *Journal of Education*, *64*. Retrieved from http://joe.ukzn.ac.za/Libraries/No_64_2016/Introducing_cooperative_learning_Students_attitudes_towards_learning_and_the_implications_for_self-directed_learning.sflb.ashx

Mercer, N. (2004). Sociocultural discourse analysis: analysing classroom talk as a social mode of thinking. *Journal of Applied Linguistics*, *1*(2), 137–168.

Mercer, N. (2013). Classroom talk and the development of self-regulation and metacognition. In D. Whitebread, N. Mercer, C. Howe, & A. Tolmie (Eds.), *Self-regulation and dialogue in the primary classrooms* (pp. 1–24). Leicester: The British Psychological Society.

Mercer, N., Dawes, L., Wegerif, R., & Sams, C. (2004). Reasoning as a scientist: ways of helping children to use language to learn science. *British Educational Research Journal*, *30*(3), 359–377. https://doi.org/10.1080/0141192041000168968 9

Mercer, N., & Littleton, K. (2007). *Dialogue and the development of children's thinking*. London: Routledge.

Merriam, S. B. (2009). *Qualitative Research: A Guide to Design and Implementation* (3rd ed, Vol. 2nd). San Francisco: Jossey Bass.

Michou, A., Matos, L., Gargurevich, R., Gumus, B., & Herrera, D. (2016). Building on the Enriched Hierarchical Model of Achievement Motivation: Autonomous and Controlling Reasons Underlying Mastery Goals. *Psychologica Belgica*, *56*(3), 269–287. https://doi.org/10.5334/pb.281

Middleton, M., & Midgley, C. (1997). *An Under-Explored Aspect of Goal Theory*. New York.

Midgley, C., Kaplan, A., & Middleton, M. (2001). Performance-approach goals: Good for what, for whom, under what circumstances, and at what cost? *Journal of Educational Psychology*, *93*(1), 77–86. https://doi.org/10.1037/0022-0663.93.1.77

Midgley, C., Middleton, M., Gheen, M., & Kumar, R. (2012). Stage-Environment fit revisited: A goal theory approach to examining school transitions. In C. Midgley (Ed.), *Goals, goal structures and patterns of adaptive learning* (pp. 109–142). New York: Routledge.

Miñano Pérez, P., Castejón Costa, J.-L., & Gilar Corbí, R. (2012). An Explanatory Model of Academic Achievement based on Aptitudes, Goal Orientations, Self-Concept and Learning Strategies. *The Spanish Journal Pf Psychology*, *15*(1), 48–60. https://doi.org/10.5209/rev_SJOP.2012.v15.n1.37283

Minguela, M., Solé, I., & Pieschl, S. (2015). Flexible self-regulated reading as a cue for deep comprehension: evidence from online and offline measures. *Reading and Writing*, *28*(5), 721–744. https://doi.org/10.1007/s11145-015-9547-2

Mitchell, R., & Lee, J. H.-W. (2003). Sameness and difference in classroom learning cultures: interpretations of communicative pedagogy in the UK and Korea. *Language Teaching Research*, *7*(1), 35–63. https://doi.org/10.1191/1362168803lr114oa

Miyake, N., & Kirschner, P. A. (2014). The Social and Interactive Dimensions of Collaborative Learning. In K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences* (2nd ed., pp. 418–438). Cambridge: Cambridge University Press.

Mok, M. M. C., Kennedy, K. J., Moore, P. J., Shan, P. W., & Leung, S. O. (2008). The Use of Help-Seeking by Chinese Secondary School Students : Challenging the Myth of "the Chinese Learner." *Evaluation and Research in Education*, *21*(3), 188–213. https://doi.org/10.1080/09500790802485229

Moreano, G. (2005). Relaciones entre autoconcepto academico, atribuciones de exito y fracaso, y rendimiento academico en escolares preadolescentes. *Revista de Psicologia de La PUCP*, *23*(1), 5–38. Retrieved from http://revistas.pucp.edu.pe/index.php/psicologia

Morrison, K. (2013). Interviewing children in uncomfortable settings: 10 lessons for effective practice. *Educational Studies*, *39*(3), 320–337. https://doi.org/10.1080/03055698.2012.760443

Moschner, B., Anschuetz, A., Wernke, S., & Wagener, U. (2008). Measurement of Epistemological Beliefs and Learning Strategies of Elementary School Children. In M. S. Khine (Ed.), *Knowing, Knowledge and Beliefs* (pp. 113–133). Dordrecht: Springer Netherlands. Retrieved from http://link.springer.com/10.1007/978-1-4020-6596-5_5

Moyles, J. (2003). Just what IS interactive teaching? In J. Moyles, L. Hargreaves, R. Merry, F. Paterson, & V. Esarte-Sarries (Eds.), *Interactive teaching in the primary classroom: Digging deeper into meanings.* (pp. 1–14). Maidenhead: Open University Press.

Muis, K. R., Psaradellis, C., Chevrier, M., Di Leo, I., & Lajoie, S. P. (2016). Learning by preparing to teach: Fostering self-regulatory processes and achievement during complex mathematics problem solving. *Journal of Educational Psychology*, *108*(4), 474–492. https://doi.org/10.1037/edu0000071

Murayama, K., & Elliot, A. J. (2009). The joint influence of personal achievement goals and classroom goal structures on achievement-relevant outcomes. *Journal of Educational Psychology*, *101*(2), 432–447. https://doi.org/10.1037/a0014221

Naudi, D. (2012). *The nature of goal orientations and their relationships with performance, mental effort and self-efficacy*. Loughborough University. Retrieved from https://dspace.lboro.ac.uk/2134/9665

Näykki, P., Järvenoja, H., Järvelä, S., & Kirschner, P. (2017). Monitoring makes a difference: quality and temporal variation in teacher education students' collaborative learning. *Scandinavian Journal of Educational Research*, *61*(1), 31–46. https://doi.org/10.1080/00313831.2015.1066440

Neal, D. J., & Carey, K. B. (n.d.). A Follow-Up Psychometric Analysis of the Self-Regulation Questionnaire. Psychology of Addictive Behaviors, 19(4), 414-422. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2431129/pdf/nihms53836.pdf

Nelson, T., & Narens, L. (1990). Metamemory: a theoretical framework and new findings. In G. H. Bower (Ed.), *The Psychology of Learning and Motivation* (Vol. 26, pp. 125–173). New York: Academic Press.

Newman, R. S. (2002). How Self-Regulated Learners Cope with Academic Difficulty: The Role of Adaptive Help Seeking. *Theory Into Practice*, *41*(2), 132–138. https://doi.org/10.1207/s15430421tip4102_10

Newman, R. S. (2003). When Elementary School Students Are Harassed by Peers: A Self-Regulative Perspective on Help Seeking. *The Elementary School Journal*, *103*(4), 339–355. Retrieved from http://www.jstor.org/stable/1002288

Newman, R. S., & Schwager, M. T. (1993). Students' Perceptions of the Teacher and Classmates in Relation

to Reported Help Seeking in Math Class Help Seeking in Math Class. *Elementary School Journal*, *94*(1), 3–17. Retrieved from http://www.jstor.org/stable/1001871

Newton, P. E., & Shaw, S. D. (2014). *Validity in educational and psychological assessment*. London: Sage.

Niemivirta, M., Rijavec, M., & Yamauchi, H. (2001). Goal orientations and action-control beliefs: A cross-cultural comparison among Croation, Finish, and Japanese students. In A. Efklides, J. Kuhl, & R. M. Sorrentino (Eds.), *Trends and Prospects in Motivation Research* (pp. 163–183). Dordrecht: Springer Netherlands.

Nolen, S. B., & Haladyna, T. M. (1990). Personal and environmental influences on students' beliefs about effective study strategies. *Contemporary Educational Psychology*, *15*(2), 116–130. https://doi.org/10.1016/0361-476X(90)90011-O

Nuthall, G. (2005). The cultural myths and realities of classroom teaching and learning: A personal Journey. *Teachers College Record*, *107*(5), 895–934. https://doi.org/10.1111/j.1467-9620.2005.00498.x

Nuzzo, R. L. (2016). Statistical Power. *PM&R*, *8*(9), 907–912. https://doi.org/10.1016/j.pmrj.2016.08.004

Nystrand, M., Wu, L. L., Gamoran, A., Zeiser, S., & Long, D. A. (2003). Questions in Time: Investigating the Structure and Dynamics of Unfolding Classroom Discourse. *Discourse Processes*, *35*(2), 135–198. https://doi.org/10.1207/S15326950DP3502_3

Ogan, A., Walker, E., Baker, R., Rodrigo, M. M. T., Soriano, J. C., & Castro, M. J. (2015). Towards understanding how to assess help-seeking behavior across cultures. *International Journal of Artificial Intelligence in Education*, *25*(2), 229–248. https://doi.org/10.1007/s40593-014-0034-8

Ommundsen, Y. (2006). Pupils' self-regulation in physical education: the role of motivational climates and differential achievement goals. *European Physical Education Review*, *12*(3), 289–315. https://doi.org/10.1177/1356336X06069275

Ongowo, R. O., & Hungi, S. K. (2014). Motivational beliefs and self-regulation in biology learning : Influence of ethnicity , gender and grade level in Kenya. *Creative Education*, *5*(4), 218–227. https://doi.org/10.4236/ce.2014.54031

Ornstein, P. A., Grammer, J. K., & Coffman, J. L. (2010). Teachers' "mnemonic style" and the development of skilled memory. In H. S. Waters & W. Schneider (Eds.), *Metacognition, strategy use, and instruction* (pp. 23–53). New York: Guilford Press.

Oyserman, D. (2007). Social identity and self-regulation. In A. Kruglanski & E. Higgins (Eds.), *Social psychology: Handbook of basic principles* (pp. 432–453). New York: Guilford Press.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal Teaching of Comprehension- Fostering and Comprehension- Monitoring Activities. *Cognition and Instruction*, *1*(2), 117–175. https://doi.org/10.1207/s1532690xci0102

Palincsar, A. S., Brown, A. L., & Martin, S. M. (1987). Peer Interaction in Reading Comprehension Instruction. *Educational Psychologist*, *22*(3), 231–253. https://doi.org/10.1080/00461520.1987.9653051

Panadero, E., & Järvelä, S. (2015). Socially shared regulation of learning: A review. *European Psychologist*, *20*(3), 190–203. https://doi.org/10.1027/1016-9040/a000226

Panadero, E., Kirschner, P. A., Järvelä, S., Malmberg, J., & Järvenoja, H. (2015). How Individual Self-Regulation Affects Group Regulation and Performance: A Shared Regulation Intervention. *Small Group*, *46*(4), 431–454. https://doi.org/10.1177/1046496415591219

Patrick, H., Kaplan, A., & Ryan, A. M. (2011). Positive classroom motivational environments: Convergence between mastery goal structure and classroom social climate. *Journal of Educational Psychology*, *103*(2), 367–382. https://doi.org/10.1037/a0023311

Patrick, H., Ryan, A. M., & Kaplan, A. (2007). Early adolescents' perceptions of the classroom social environment, motivational beliefs, and engagement. *Journal of Educational Psychology*, *99*(1), 83–98. https://doi.org/10.1037/0022-0663.99.1.83

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.

Perry, N. E. (1998). Young children's self-regulated learning and contexts that support it. *Journal of Educational Psychology*, *90*(4), 715–729. https://doi.org/10.1037/0022-0663.90.4.715

Perry, N. E. (2013). Understanding classroom processes that support children's self-regulation of learning. In D. Whitebread, N. Mercer, C. Howe, & A. Tolmie (Eds.), *Self-regulation and Dialogue in primary classrooms.* (pp. 45–68). Leicester: The British Psychological Society.

Perry, N. E., & Rahim, A. (2011). Studying self-regulated learning in classrooms. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 122–136). New York: Routledge.

Perry, N. E., & Winne, P. H. (2013). Tracing students' regulation of learning in complex collaborative tasks. In S. Volet & M. Vauras (Eds.), *Interpersonal regulation of learning and motivation* (pp. 45–66). New York: Routledge.

Phan, H. P. (2009). Exploring students' reflective thinking practice, deep processing strategies, effort, and achievement goal orientations. *Educational Psychology*, *29*(3), 297–313. https://doi.org/10.1080/01443410902877988

Phillipson, S. (2006). Cultural Variability in Parent and Child Achievement Attributions: A study from Hong Kong. *Educational Psychology*, *26*(5), 625–642. https://doi.org/10.1080/01443410500390772

Piaget, J. (1970). *Genetic epistemology*. New York: Columbia University Press.

Pichardo, C., Justicia, F., De la Fuente, J., Martínez-Vicente, J. M., & Berbén, A. B. (2014). Factor Structure of the Self-Regulation Questionnaire (SRQ) at Spanish Universities. *Spanish Journal of Psychology*, *17*(62), 1–8. https://doi.org/10.1017/sjp.2014.63

Pino-Pasternak, D., Whitebread, D., & Tolmie, A. (2010). A Multidimensional Analysis of Parent–Child Interactions During Academic Tasks and Their Relationships With Children's Self-Regulated Learning. *Cognition and Instruction*, *28*(3), 219–272. https://doi.org/10.1080/07370008.2010.490494

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of Self-Regulation* (pp. 451–502). San Diego, CA: Academic Press.

Pintrich, P. R. (2003). A Motivational Science Perspective on the Role of Student Motivation in Learning and Teaching Contexts. *Journal of Educational Psychology*, *95*(4), 667–686. https://doi.org/10.1037/0022-0663.95.4.667

Pintrich, P. R. (2004). A Conceptual Framework for Assessing Motivation and Self-Regulated Learning in College Students. *Educational Psychology Review*, *16*(4), 385–407. https://doi.org/https://doi.org/10.1007/s10648-004-0006-x

Pintrich, P. R., Smith, D., Garcia, T., & McKeachie, W. (1993). Reliability and predictive validity of the motivated strategies for learning questionnaire. *Educational and Psychological Measurement*, *53*(3), 801–813. Retrieved from http://libsta28.lib.cam.ac.uk:2075/doi/pdf/10.1177/0013164493053003024

PIRLS. (2014). *Parental involvement in school activities and reading literacy: Findings and implications from PIRLS 2011 data*. Retrieved from http://www.iea.nl/fileadmin/user_upload/Policy_Briefs/IEA_policy_brief_Mar2014.pdf

Planel, C. (1997). National cultural values and their role in learning: A comparative ethnographic study of state primary schooling in England and France. *Comparative Education*, *33*(3), 349–373. https://doi.org/10.1080/03050069728415

Potgieter, J. C., & Botha, K. F. H. (2009). Psychometric properties of the Short Self-Regulation Questionnaire (SSRQ) in a South African context. *Journal of Psychology in Africa*, *19*(3), 321–328. Retrieved from http://www.tandfonline.com/toc/rpia20/current

Preiss, D. D. (2009). The Chilean instructional pattern for the teaching of language: A video-survey study based on a national program for the assessment of teaching. *Learning and Individual Differences*, *19*(1), 1–11. https://doi.org/10.1016/j.lindif.2008.08.004

Preiss, D. D., Calcagni, E., Espinoza, A. M., Gómez, D., Grau, V., Guzmán, V., … Volante, P. (2014). Good Pedagogical Practices Observed in Middle-School Level Lessons in Chile. *Psykhe*, *23*(2), 1–12. https://doi.org/10.7764/psykhe.23.2.716

Pressley, M., Wharton-McDonald, R., Mistretta-Hampston, J., & Echevarria, M. (1998). Literacy instruction in 10 Fourth-Grade Classrooms in Upstate New York. *Scientific Studies of Reading*, *2*(2), 159–194. https://doi.org/10.1207/s1532799xssr0202

Price, J., Hertzog, C., & Dunlosky, J. (2010). Self-regulated learning in younger and older adults: does aging affect metacognitive control? *Aging, Neuropsychology and Cognition*, *17*(3), 329–59. https://doi.org/10.1080/13825580903287941

Puntambekar, S., & Hubscher, R. (2005). Identifying teacher expertise: An examination of researcher's decision making. *Educational Psychologist*, *40*(1), 1–12. https://doi.org/10.1207/s15326985ep4001

Purdie, N., & Hattie, J. (1996). Cultural Differences in the Use of Strategies for Self-Regulated Learning. *American Educational Research Journal*, *33*(4), 845–871. https://doi.org/10.3102/00028312033004845

Purdie, N., Hattie, J., & Douglas, G. (1996). Student conceptions of learning and their use of self-regulated learning strategies: A cross-cultural comparison. *Journal of Educational Psychology*, *88*(1), 87–100. https://doi.org/10.1037/0022-0663.88.1.87

Rabe-Hesketh, S., & Skrondal, A. (2012). *Multilevel and Longitudinal Modeling Using Stata. Volume I: Continuous Responses.* (3rd ed.). Texas: Stata Press.

Radovic, D., & Preiss, D. D. (2010). Discourse Patterns Observed in Middle-School Level Mathematics Classes in Chile. *Psykhe*, *19*(2), 65–79. https://doi.org/10.4067/S0718-22282010000200007

Raidal, S. L., & Volet, S. E. (2009). Preclinical students' predispositions towards social forms of instruction and self-directed learning: a challenge for the development of autonomous and collaborative learners. *Higher Education*, *57*(5), 577–596. https://doi.org/10.1007/s10734-008-9163-z

Raver, C. C., Jones, S. M., Li-grining, C., Zhai, F., Bub, K., & Pressler, E. (2011). CSRP's Impact on Low-Income Preschoolers ' Preacademic Skills : Self-Regulation as a Mediating Mechanism. *Child Development*, *82*(1), 362–378. https://doi.org/10.1111/j.1467-8624.2010.01561.x

Reeve, J. (2009). Why Teachers Adopt a Controlling Motivating Style Toward Students and How They Can Become More Autonomy Supportive. *Educational Psychologist*, *44*(3), 159–175. https://doi.org/10.1080/00461520903028990

Robson, S. (2016). Self-regulation, metacognition and child- and adult-initiated activity: does it matter who initiates the task? *Early Child Development and Care*, *186*(5), 764–784. https://doi.org/10.1080/03004430.2015.1057581

Roeser, R. W., Midgley, C., & Urdan, T. C. (1996). Perceptions of the school psychological environment and early adolescents' psychological and behavioral functioning in school: The mediating role of goals and belonging. *Journal of Educational Psychology*, *88*(3), 408–422. https://doi.org/10.1037/0022-0663.88.3.408

Rogers, C. (1998). Motivational indicators in the United Kingdom and the People's Republic of China. *Educational Psychology*, *18*(3), 275–291. https://doi.org/10.1080/0144341980180302

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York: Oxford University Press.

Rogoff, B. (2003). *The cultural nature of human development*. Oxford: Oxford University Press.

Rogoff, B., & Lave, J. (1984). *Everyday cognition: Its development in social context*. (B. Rogoff & J. Lave, Eds.). Cambridge, Mass.: Harvard University Press.

Rojas-Drummond, S., Gómez, L., & Vélez, M. (2008). Dialogue for reasoning: Promoting exploratory talk and problem solving in the primary classroom. In B. Van Oers, W. Wardekker, E. Elbers, & R. Van der Veer (Eds.), *The transformation of learning. Advances in Cultural-Historical Activity Theory* (pp. 319–341). Cambridge: Cambridge University Press.

Roll, I., Aleven, V., Mclaren, B. M., & Koedinger, K. R. (2011). Improving students' help-seeking skills using metacognitive feedback in an intelligent tutoring system. *Learning and Instruction*, *21*(2), 267–280. https://doi.org/10.1016/j.learninstruc.2010.07.004

Roll, I., Baker, R. S. J. D., Aleven, V., & Koedinger, K. R. (2014). On the Benefits of Seeking (and Avoiding) Help in Online Problem-Solving Environments. *THE JOURNAL OF THE LEARNING SCIENCES*, *23*(4), 537–560. https://doi.org/10.1080/10508406.2014.883977

Rolland, R. G. (2012). Synthesizing the evidence on classroom goal structures in middle and secondary schools: A meta-analysis and narrative review. *Review of Educational Research*, *82*, 396–435. https://doi.org/10.3102/0034654312464909

Roussel, P., Elliot, A. J., & Feltman, R. (2011). The influence of achievement goals and social goals on help-

seeking from peers in an academic context. *Learning and Instruction*, *21*(3), 394–402. https://doi.org/10.1016/j.learninstruc.2010.05.003

Ryan, A. M., Pintrich, P. R., & Midgley, C. (2001). Avoiding Seeking Help in the Classroom: Who and Why? *Educational Psychology Review*, *13*(2), 93–114. https://doi.org/https://doi.org/10.1023/A:1009013420053

Scheerens, J., Witziers, B., & Steen, R. (2013). A Meta-analysis of School Effectiveness Studies. *Revista de Educacion*, *2013*(361), 619–645. https://doi.org/10.4438/1988-592X-RE-2013-361-235

Schmitt, S. A., Pratt, M. E., & McClelland, M. M. (2014). Examining the Validity of Behavioral Self-Regulation Tools in Predicting Preschoolers' Academic Achievement. *Early Education and Development*, *25*(5), 641–660. https://doi.org/10.1080/10409289.2014.850397

Schneider, W. (2010). Metacognition and memory development in childhood and adolescence. In H. S. Waters & W. Schneider (Eds.), *Metacognition, strategy use, and instruction* (pp. 54–81). New York: Guilford Press.

Schunk, D. H., & Zimmerman, B. J. (2008). *Motivation and self-regulated learning : theory, research, and applications* (Mahwah, NJ). Lawrence Erlbaum Associates.

Schwartz, S. H. (2011). Values: Cultural and Individual. In F. J. van de Vijver, A. Chasiotis, & S. Breugelmans (Eds.), *Fundamental Questions in Cross-Cultural Psychology* (pp. 463–493). Cambridge: Cambridge University Press.

Serpell, R., & Hatano, G. (1997). Education, Schooling, and Literacy. In J. Berry, P. Dasen, & T. Saraswathi (Eds.), *Handbook of Cross-Cultural Psychology Vol. 2* (2nd ed., pp. 339–376). Needham Heights: Allyn & Bacon.

Sheldon, K., & Elliot, A. J. (1998). Not all personal goals are personal: Comparing autonomous and controlled reasons for goals as predictors of effort and attainment. *Personality and Social Psychology Bulletin*, *24*(5), 546–557. Retrieved from http://journals.sagepub.com/home/psp

Shih, S. (2007). The Role of Motivational Characteristics in Taiwanese Sixth Graders' Avoidance of Help Seeking in the classroom. *The Elementary School Journal*, *107*(5), 473–495. https://doi.org/10.1086/518624

Shim, S. S., & Finch, W. H. (2014). Academic and social achievement goals and early adolescents' adjustment: A latent class approach. *Learning and Individual Differences*, *30*, 98–105. https://doi.org/10.1016/j.lindif.2013.10.015

Shim, S. S., Kiefer, S. M., & Wang, C. (2013). Help Seeking Among Peers : The Role of Goal Structure and Peer Climate. *The Journal of Educational Research, 106*(4), 290–300. https://doi.org/10.1080/00220671.2012.692733

Silverman, D. (1993). *Interpreting Qualitative Data*. London: SAGE Publications.

Skibbe, L. E., Connor, C. M., Morrison, F. J., & Jewkes, A. M. (2011). Schooling effects on preschoolers' self-regulation, early literacy, and language growth. *Early Childhood Research Quarterly*, *26*(1), 42–49. https://doi.org/10.1016/j.ecresq.2010.05.001

Smith, P. B., & Schwartz, S. H. (1997). Values. In J. W. Berry, M. H. Segall, & C. Kagitcibasi (Eds.), *Handbook of cross-cultural psychology, Vol. 3* (2nd ed., pp. 77–118). Boston: Allyn & Bacon.

Snijders, T. A. B. (2005). Power and sample size in multilevel modeling. In B. S. Everitt & D. . Howell (Eds.), *Encyclopaedia of Statistics in Behavioural Science, Vol. 3* (pp. 1570–1573). Chichester, UK: Wiley.

Snijders, T. A. B., & Bosker, R. J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd ed.). London: Sage.

Stankov, L., & Lee, J. (2014). Overconfidence Across World Regions. *Journal of Cross-Cultural Psychology*, *45*(5), 821–837. https://doi.org/10.1177/0022022114527345

Staub, F. C. (2007). Mathematics classroom cultures: Methodological and theoretical issues. *International Journal of Educational Research*, *46*(5), 319–326. https://doi.org/10.1016/j.ijer.2007.10.007

Steuer, G., Rosentritt-Brunn, G., & Dresel, M. (2013). Dealing with errors in mathematics classrooms: Structure and relevance of perceived error climate. *Contemporary Educational Psychology*, *38*(3), 196–210. https://doi.org/10.1016/j.cedpsych.2013.03.002

Stevens, J. P. (2002). *Applied multivariate statistics for social sciences* (4th ed.). Mahwah, NJ: Lawrence

Erlbaum.

Stigler, J., & Perry, M. (1988). Mathematics learning in Japanese, Chinese and American classrooms. *New Developments in Child and Adolescent Development*, *41*(Fall), 27–54. https://doi.org/10.1002/cd.23219884104

Stipek, D., Feiler, R., Daniels, D., & Milburn, S. (1995). Effects of Different Instructional Approaches on Young Children's Achievement and Motivation. *Child Development*, *66*(1), 209–223. https://doi.org/10.1111/j.1467-8624.1995.tb00866.x

Stipek, D., Givvin, K. B., Salmon, J. M., & Macgyvers, V. L. (1998). Can a Teacher Intervention Improve Classroom Practices and Student Motivation in Mathematics? *The Journal of Experimental Education*, *66*(4), 319–337. https://doi.org/10.1080/00220979809601404

Stodolsky, S. S. (1988). *The subject matters: Classroom activity in math and social studies.* Chicago: The University of Chicago Press.

Stright, A. D., Herr, M. Y., & Neitzel, C. (2009). Maternal scaffolding of children's problem solving and children's adjustment in kindergarten: Hmong families in the United States. *Journal of Educational Psychology*, *101*(1), 207–218. https://doi.org/10.1037/a0013154

Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics* (3rd ed.). New York: HarperCollins. Retrieved from https://books.google.co.uk/books/about/Using_Multivariate_Statistics.html?id=lVtqAAAAMAAJ&redir_esc=y

Tang, M., & Neber, H. (2008). Motivation and self-regulated science learning in high-achieving students: differences related to nation, gender, and grade-level. *High Ability Studies*, *19*(2), 103–116. https://doi.org/10.1080/13598130802503959

Taut, S., Valencia, E., Palacios, D., Santelices, M. V, Jiménez, D., & Manzi, J. (2016). Teacher performance and student learning: linking evidence from two national assessment programmes. *Assessment in Education: Principles, Policy, & Practice*, *23*(1), 53–74. https://doi.org/10.1080/0969594X.2014.961406

Teddlie, C., & Tashakkori, A. (2009). *Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences*. *Book* (Vol. 1). Los Angeles: Sage. Retrieved from http://books.google.com/books?hl=en&lr=&id=XvMAYYvS1rEC&pgis=1

Timmons, K., Pelletier, J., & Corter, C. (2016). Understanding children's self-regulation within different classroom contexts. *Early Child Development and Care*, *186*(2), 249–267. https://doi.org/10.1080/03004430.2015.1027699

Tock, J. L., & Moxley, J. H. (2017). A comprehensive reanalysis of the metacognitive self-regulation scale from the MSLQ. *Metacognition and Learning*, *12*(1), 79–111. https://doi.org/10.1007/s11409-016-9161-y

Tomasello, M. (1999). *The cultural origins of cognition*. Cambridge, MA: Harvard University Press.

Tomasetto, C., Mirisola, A., Galdi, S., & Cadinu, M. (2015). Parents' math-gender stereotypes, children's self-perception of ability, and children's appraisal of parents' evaluations in 6-year-olds. *Contemporary Educational Psychology*, *42*, 186–198. https://doi.org/10.1016/j.cedpsych.2015.06.007

Torras, M. E., & Mayordomo, R. (2011). Teaching presence and regulation in an electronic portfolio. *Computers in Human Behavior*, *27*(6), 2284–2291. https://doi.org/10.1016/j.chb.2011.07.007

Trobst, S., Kleickmann, T., Lange-Schubert, K., Rothkopf, A., & L, Moller, K. (2016). Instruction and Students Declining Interest in Science: An Analysis of German Fourth- and Sixth-Grade Classrooms. *American Educational Research Journal*, *53*(1), 162–193. https://doi.org/10.3102/0002831215618662

Trommsdorff, G., Cole, P. M., & Heikamp, T. (2012). Cultural Variations in Mothers' Intuitive Theories: a preliminary report on interviewing mothers from five nations about their socialization of children's emotions. *Global Studies of Childhood*, *2*(2), 158–169. https://doi.org/10.2304/gsch.2012.2.2.158

Turner, J. C., Meyer, D. K., Cox, K. E., Logan, C., DiCintio, M., & Thomas, C. T. (1998). Creating contexts for involvement in mathematics. *Journal of Educational Psychology*, *90*(4), 730–745. https://doi.org/10.1037/0022-0663.90.4.730

Turner, J. C., Meyer, D. K., Midgley, C., & Patrick, H. (2003). Teacher Discourse and Sixth Graders' Reported Affect and Achievement Behaviors in Two High-Mastery/High-Performance Mathematics

Classrooms. *The Elementary School Journal*, *103*(4), 357. https://doi.org/10.1086/499731

Turner, J. C., Midgley, C., Meyer, D. K., Gheen, M., Anderman, E. M., Kang, Y., & Patrick, H. (2002). The classroom environment and students' reports of avoidance strategies in mathematics: A multimethod study. *Journal of Educational Psychology*, *94*(1), 88–106. https://doi.org/10.1037/0022-0663.94.1.88

Turner, J. E., & Fulmer, S. M. (2013). Observing interpersonal regulation of engagement during instruction in middle school classrooms. In S. Volet & M. Vauras (Eds.), *Interpersonal regulation of learning and motivation* (pp. 147–169). New York: Routledge.

Urdan, T. (2004a). Predictors of Academic Self-Handicapping and Achievement: Examining Achievement Goals, Classroom Goal Structures, and Culture. *Journal of Educational Psychology*, *96*(2), 251–264. https://doi.org/10.1037/0022-0663.96.2.251

Urdan, T. (2004b). Using Multiple Methods to Assess Students' Perceptions of Classroom Goal Structures. *European Psychologist*, *9*(4), 222–231. https://doi.org/10.1027/1016-9040.9.4.222

Urdan, T., & Giancarlo, C. (2000). *Differences between Students in the Consequences of Goals and Goal Structures: The Role of Culture and Family Obligation.* New York. Retrieved from https://eric.ed.gov/?id=ED454331

Urdan, T., & Mestas, M. (2006). The goals behind performance goals. *Journal of Educational Psychology*, *98*(2), 354–365. https://doi.org/10.1037/0022-0663.98.2.354

Urdan, T., & Midgley, C. (2003). Changes in the perceived classroom goal structure and pattern of adaptive learning during early adolescence. *Contemporary Educational Psychology*, *28*(4), 524–551. https://doi.org/10.1016/S0361-476X(02)00060-7

Valenzuela, J. P., Belleï, C., & de los Ríos, D. (2013). Socioeconomic school segregation in a market-oriented educational system. The case of Chile. *Journal of Education Policy*, *29*(2), 217–241. https://doi.org/10.1080/02680939.2013.806995

van de Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in teacher-student interaction: A decade of research. *Educational Psychology Review*, *22*, 271–296. https://doi.org/10.1007/s10648-010-9127-6

van de Pol, J., Volman, M., & Beishuizen, J. (2011). Patterns of contingent teaching in teacher-student interaction. *Learning and Instruction*, *21*(1), 46–57. https://doi.org/10.1016/j.learninstruc.2009.10.004

van de Pol, J., Volman, M., & Beishuizen, J. (2012). Promoting teacher scaffolding in small-group work: A contingency perspective. *Teaching and Teacher Education*, *28*(2), 193–205. https://doi.org/10.1016/j.tate.2011.09.009

van den Boom, G., Paas, F., & van Merriënboer, J. J. G. (2007). Effects of elicited reflections combined with tutor or peer feedback on self-regulated learning and learning outcomes. *Learning and Instruction*, *17*(5), 532–548. https://doi.org/10.1016/j.learninstruc.2007.09.003

Vauras, M., Kinnunen, R., Kajamies, A., & Lehtinen, E. (2013). Interpersonal regulation in instructional interaction. In S. Volet & M. Vauras (Eds.), *Interpersonal regulation of learning and motivation* (pp. 125–146). New York: Routledge.

Veenman, S., Denessen, E., van der Akker, A., & van der Rijt, J. (2005). Effects of a Cooperative Learning Program on the Elaborations of Students during Help Seeking and Help Giving. *American Educational Research Journal, 42*(1), 115–151.

Vermunt, J. D. (1998). The regulation of constructive learning processes. *British Journal of Educational Psychology*, *68*(2), 149–171. https://doi.org/10.1111/j.2044-8279.1998.tb01281.x

Vermunt, J. D. (2005). Relations between student learning patterns and personal and contextual factors and academic performance. *Higher Education*, *49*(3), 205–234. https://doi.org/10.1007/sl0734-004-6664-2

Vermunt, J. D., & Verloop, N. (1999). Congruence and friction between learning and teaching. *Learning and Instruction*, *9*(3), 257–280. https://doi.org/10.1016/S0959-4752(98)00028-0

Villa, J. (2012). Review of the book "Desafíos comunes: retrato de la sociedad chilena y sus individuos" by Kathya Araujo y Danilo Martuccelli (Santiago: LOM Ediciones, 2012). *Debates En Sociología N°*, *37*, 175–178. Retrieved from

http://revistas.pucp.edu.pe/index.php/debatesensociologia

Vlachou, M. A. (2015). Does Assessment for Learning Work to Promote Student Learning? The England Paradigm. *The Clearing House*, *88*(3), 101–107. https://doi.org/10.1080/00098655.2015.1032194

Volet, S., Summers, M., & Thurman, J. (2009). High-level co-regulation in collaborative learning: How does it emerge and how is it sustained? *Learning and Instruction*, *19*(2), 128–143. https://doi.org/10.1016/j.learninstruc.2008.03.001

Volet, S., Vauras, M., & Salonen, P. (2009). Self- and Social Regulation in Learning Contexts: An Integrative Perspective. *Educational Psychologist*, *44*(4), 215–226. https://doi.org/10.1080/00461520903213584

Vygotsky, L. S. (1978). *Mind in society: the development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Vygotsky, L. S. (2012). *Thought and Language* (Revised). Cambridge, MA: MIT Press.

Walker, R. A., Pressick-Kilborn, K., Arnold, L. S., & Sainsbury, E. J. (2004). Investigating motivation in context: Developing sociocultural perspectives. *European Psychologist*, *9*(4), 245–256. https://doi.org/10.1027/1016-9040.9.4.245

Washburn, D. A., & Thompson Putney, R. (2001). Attention and Task Difficulty: When Is Performance Facilitated? *Learning and Motivation*, *32*(1), 36–47. https://doi.org/10.1006/lmot.2000.1065

Waters, H. S., & Kunnmann, T. W. (2010). Metacognition and strategy discovery in early childhood. In H. S. Waters & W. Schneider (Eds.), *Metacognition, strategy use, and instruction* (pp. 3–22). New York: Guilford Press.

Waters, H. S., & Schneider, W. (2010). *Metacognition, strategy use, and instruction*. New York: Guilford Press.

Watkins, L. (2010). The cross-cultural appropriateness of survey-based value(s) research: A review of methodological issues and suggestion of alternative methodology. *International Marketing Review*, *27*(6), 694–716. https://doi.org/10.1108/02651331011088290

Wegerif, R., Perez Linares, J., Rojas-Drummond, S., Mercer, N., & Velez, M. (2005). Thinking together in the UK and Mexico: Transfer of an educational innovation. *Journal of Classroom Interaction*, *40*(1), 40–48. Retrieved from http://www.jstor.org/stable/43997884

Wertsch, J. V. (1979a). From Social Interaction to Higher Psychological Processes. *Human Development*, *22*(1), 1–22. https://doi.org/10.1159/000112532

Wertsch, J. V. (1979b). From Social Interaction to Higher Psychological Processes. A clarification and application of Vygotsky's theory. *Human Development*, *22*, 1–22. https://doi.org/10.1159/000112532

Wertsch, J. V. (1991). *Voices of the mind*. Cambridge, MA: Harvard University Press.

Wertsch, J. V. (2007). Mediation. In H. Daniels, M. Cole, & J. Wertsch (Eds.), *The Cambridge Companion to Vygotsky* (pp. 178–192). Cambridge: Cambridge University Press.

Whitebread, D., Bingham, S., Grau, V., Pino-Pasternak, D., & Sangster, C. (2007). Development of Metacognition and Self-Regulated Learning in Young Children: Role of Collaborative and Peer-Assisted Learning. *Journal of Cognitive Education and Psychology*, *6*(3), 433–455. https://doi.org/10.1891/194589507787382043

Whitebread, D., Coltman, P., Pasternak, D. P., Sangster, C., Grau, V., Bingham, S., … Demetriou, D. (2009). The development of two observational tools for assessing metacognition and self-regulated learning in young children. *Metacognition and Learning*, *4*(1), 63–85. https://doi.org/10.1007/s11409-008-9033-1

Whitebread, D., Mercer, N., Howe, C., & Tolmie, A. (2013). *Self-regulation and dialogue in the primary classrooms.* Leicester: The British Psychological Society.

Whitebread, D., & Pino-Pasternak, D. (2010). Metacognition, self-regulation, and meta-knowing. In K. Littleton, C. Wood, & J. Staarman Kleine (Eds.), *International Handbook of Psychology and Education* (pp. 673–712). Bingley: Emeral Group Publishing.

Whitebread, D., & Pino-Pasternak, D. (2013). Video analysis of self-regulated learning in social and naturalistc contexts: the case of preschool and primary school children. In S. Volet & M. Vauras

(Eds.), *Interpersonal regulation of learning and motivation* (pp. 14–44). New York: Routledge.

Williams, J. D., & Takaku, S. (2011). Help seeking, self-efficacy, and writing performance among college students. *Journal of Writing Research*, *3*(1), 1–18. https://doi.org/10.17239/jowr

Wilson, L., Andrew, C., & Below, J. (2006). A Comparison of Teacher/Pupil Interaction within Mathematics Lessons in St Petersburg, Russia and the North-East of England. *British Educational Research Journal*, *32*(3), 411–441. https://doi.org/10.2307/30032676

Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 277–304). Mahwah, NJ: Lawrence Erlbaum Associates.

Winne, P. H., & Nesbit, J. C. (2009). Supporting self-regulated learning with cognitive tools. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 259–277). London: Routledge.

Winther-Lindqvist, D. A. (2012). Developing social identities and motives in school transitions. In M. Hedegaard, A. Edwards, & M. Fleer (Eds.), *Motives in Children's Development: Cultural-Historical Approaches* (pp. 115–132). Cambridge: Cambridge University Press.

Wolters, C. A. (2004). Advancing Achievement Goal Theory: Using Goal Structures and Goal Orientations to Predict Students' Motivation, Cognition, and Achievement. *Journal of Educational Psychology*, *96*(2), 236–250. https://doi.org/10.1037/0022-0663.96.2.236

Wolters, C. A., Benzon, M. B., & Arroyo-Giner, C. (2011). Assessing self-motivational strategies in self-regulated learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of Self-Regulation of Learning and Performance* (pp. 298–312). New York: Routledge.

Wolters, C. A., Fan, W., & Daugherty, S. G. (2013). Examining achievement goals and causal attributions together as predictors of academic functioning. *Journal of Experimental Education*, *81*(3), 295–321. https://doi.org/10.1080/00220973.2012.700498

Wood, T., Williams, G., & McNeal, B. (2006). Children's mathematical thinking in different classroom cultures. *Journal for Research in Mathematics Education*, *37*(3), 222–255. Retrieved from http://www.jstor.org/stable/30035059

Xiang, P., Lee, A. M., & Solmon, M. A. (1997). Achievement goals and their correlates among American and Chinese students in physical education: A cross-cultural analysis. *Journal of Cross-Cultural Psychology*, *28*(6), 645–660. https://doi.org/10.1177/0022022197286001

Zimmerman, B. J. (2002). Becoming Learner: Self-Regulated Overview. *Theory into Practice*, *41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2

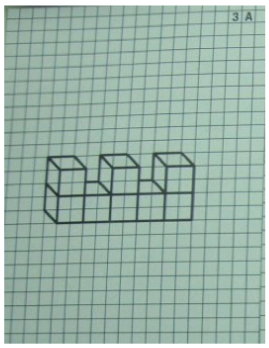
Zimmerman, B. J. (2011). Motivational Sources and Outcomes of Self-Regulated Learning and Performance. In B. Zimmerman & D. Schunk (Eds.), *Handbook of Self-Regulation of Learning and Performance* (pp. 49–64). New York: Routledge.

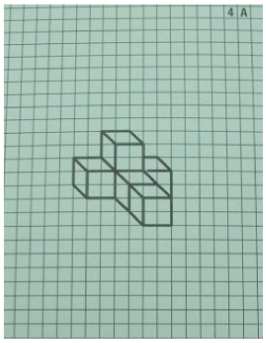
Zimmerman, B. J., & Kitsantas, A. (2002). Acquiring writing revision and self-regulatiory skill through observation and emulation. *Journal of Educational Psychology*, *94*(4), 660–668. https://doi.org/10.1037/0022-0663.91.2.241

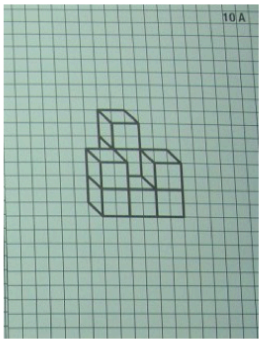
Zusho, A., & Clayton, K. (2011). Culturalizing Achievement Goal Theory and Research. *Educational Psychologist*, *46*(4), 239–260. https://doi.org/10.1080/00461520.2011.614526

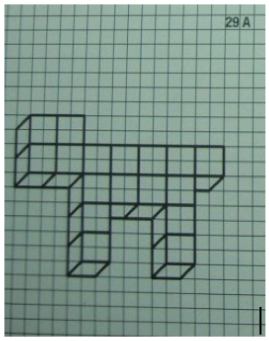
1 Appendix 1 – Cube assembly tasks

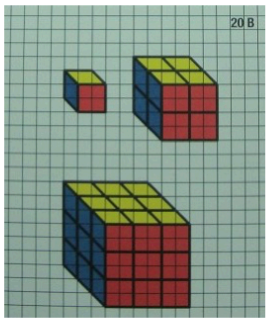
In this appendix, the thirteen cube assembly tasks that participating students carried out for the study are presented in the exact order in which they were applied (from left to right).

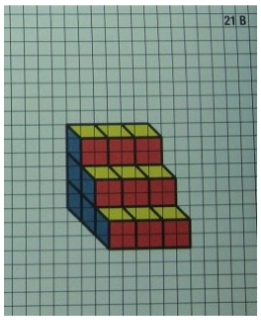


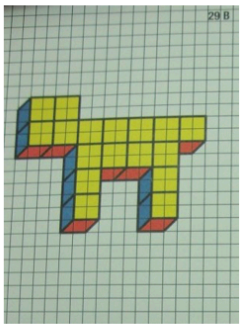


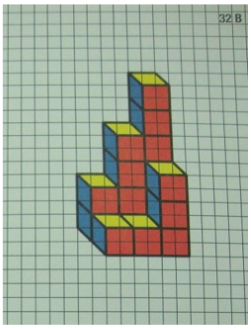


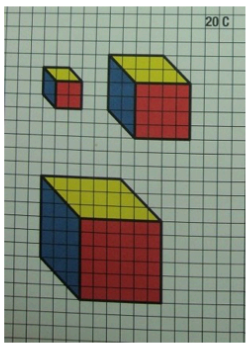


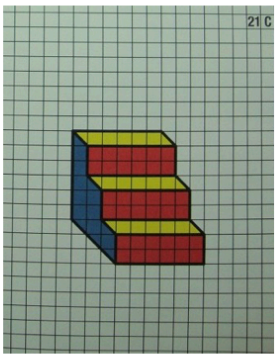


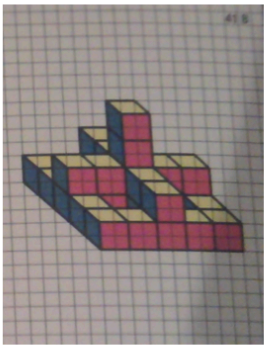












2 APPENDIX 2 – INFORMED CONSENT LETTERS AND FORMS

Informed consent was obtained from the teachers and parents of children from the participating classrooms. While an opt-out consent was used with parents from children who simple were going to be in the classroom during the filmed literacy lessons, full consent was obtained from teachers and parents of children participating actively of the study (those whose interviews, behaviours, and discourse provided the data finally analysed).

2.1 Information sent to all parents of children from participating classrooms

UNIVERSITY OF CAMBRIDGE
Faculty of Education

April, 2014

Re: Information about the "learning to learn in different cultures" research project.

Dear parent,

We have approached your child's school to invite the Year 4 class to take part in the "learning to learn in different cultures" research project. The school and the teacher are interested in taking part in the project. Here you will find information about the study and about how we would like your child to get involved.

What is the project about? The learning to learn in different cultures project is a doctoral study from the Faculty of Education, University of Cambridge. It studies how different cultures (Chilean and English) may have different effects on how students learn to become good learners. Students who become good learners also become good problem solvers and develop an ability to adapt to changes in their contexts of living. The participation of your child would help to the researcher to understand how this capacity could be enhanced considering the specificities of different cultures.

What would the research and my child's participation involve? The PhD researcher would be a teacher assistant in your child's classroom for two weeks, helping him/her and other classmates in everyday learning. Within this period, we would like your child simply to participate as part of the class as s/he usually does. There would be 3 hours of literacy lessons that would be video recorded in which your child might appear occasionally in the film as part of the class. In order to be sure that the participating classrooms in England and Chile are comparable, we will also ask the school office to provide statistical information about the educational backgrounds (e.g. secondary education, undergraduate degree) of the parents in your child's class. All this information will be treated as confidential. In case you do not wish your child to appear in the filmed lessons please just let your child's teacher know and we will blur your child's face so no one outside the research team can see him/her in the video. Similarly, if you have any concerns about the school calculating for us statistical information regarding the educational backgrounds of parents in your child's class, please let your child's teacher know. We will be happy to consider your concerns and requests within this and next month.

Who can I contact if I have any questions or concerns? If you have any questions or concerns please contact the PhD researcher, Pablo Torres (pelt2@cam.ac.uk), in the first instance. If this is unsuccessful or inappropriate please contact Dr. David Whitebread (dgw1004@cam.ac.uk) or Dr. Ros McLellan (rwm11@cam.ac.uk), supervisors of this research project. Please keep this sheet for yourself.

Yours sincerely,

Pablo Torres
PhD (c) researcher

Dr. Ros McLellan
Lecturer in Psychology & Education

Dr. David Whitebread
Senior Lecturer in Psychology & Education

Head of Faculty: Professor Peter Gronn *Secretary of the Faculty:* Kate Allen
184 Hills Road, Cambridge CB2 8PQ Telephone: +44 (0)1223 767600 www.educ.cam.ac.uk

2.2 Information sent to parents of children invited to be part of the full study

UNIVERSITY OF CAMBRIDGE
Faculty of Education

Re: Information about the "learning to learn in different cultures" research project.

Dear parent,

We have approached your child's school to invite the Year 4 class to take part in the "learning to learn in different cultures" research project. We would like to invite your child to take part in this project. Here you will find information about the study and about how we would like your child to get involved. Attached you will find a consent form for you to fill in if you are interested in your child participating.

What is the project about? The learning to learn in different cultures project is a doctoral study from the Faculty of Education, University of Cambridge. It studies how different cultures (Chilean and English) may have different effects on how students learn to become good learners. Students who become good learners also become good problem solvers and develop an ability to adapt to changes in their contexts of living. The participation of your child would help to the researcher to understand how this capacity could be enhanced considering the specificities of different cultures.

What would the research and my child's participation involve? The PhD researcher will be a teacher assistant in your child's classroom for two weeks, helping him/her and other classmates in everyday learning. Within this period, we would like to invite your child to be part of a group of six students who will take an active role in this research, carrying out activities that are quite exciting and unusual for students of their age. These six students will be video-recorded at close range as they participate in 3 hours of their ordinary literacy lessons. They will also carry out an individual 45 minute cube assembly task and participate in a 45 minute group interview. Both of these activities will occur outside the classroom. The cube assembly task will look at how they apply their 'learning to learn' capacities. The group interview will explore their motivational beliefs for 'learning to learn'. The researcher will also ask these six students about any help they might get from outside the school in their learning, such as who helps them, what they are helped with, and how they are helped, so it is possible to consider this as part of their developmental support as well. In order to be sure that the sample of children in England and Chile are comparable it would be helpful if you would be able to provide a little information about your own educational background and current occupation. All this information will be treated as confidential.

Who can I contact if I have any questions or concerns? If you have any questions or concerns please contact the PhD researcher, Pablo Torres (pelt2@cam.ac.uk), in the first instance. If this is unsuccessful or inappropriate please contact Dr. David Whitebread (dgw1004@cam.ac.uk) or Dr. Ros McLellan (rwm11@cam.ac.uk), supervisors of this research project. Please keep this sheet for yourself and, if you would like to form part of the project, fill out and return the accompanying Participant Consent Form.

Yours sincerely,

Pablo Torres
PhD (c) researcher
Dr. Ros McLellan
Lecturer in Psychology & Education
Dr. David Whitebread
Senior Lecturer in Psychology & Education

2.3 Consent forms filled in by parents of children participating of the full study

UNIVERSITY OF CAMBRIDGE
Faculty of Education

Parents' Participant Consent Form

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Study: "Learning to learn in different cultures"

- Thank you for considering allowing your child to take part in this research.
- Your child will be participating anonymously. This means that none of the information collected about him/her will be linked to his/her name or school in any published or public setting.
- Even if you sign the consent form you can ask me to withdraw your child from the study at any time. You would not need to give any explanation.
- The audios and video-recordings will only be used for the purposes of research in an academic context. They will be available only to the researcher, the supervision team or other professionals/researchers involved directly in the research project. They may be shown to other professionals only as part of the dissemination of the research and promotion of learning to learn abilities.
- Any individual child audio and video recording will be securely kept and eventually destroyed according to the research policies of the Faculty of Education of the University of Cambridge.

If you are happy for your child to take part in this project, please read the following statement and fill in the required information:

I have read the information sheet and I have had the opportunity to ask questions about it and any question that I have asked has been answered to my satisfaction. I consent voluntarily for my child to participate in this study by allowing the researcher to help him/her in the classroom, record his/her learning activities during 3 hours of literacy lesson video-recordings, carry out a cube assembly task of around 45 minutes, and participate in a 45 minute interview where motivations for learning as well as educational support available to him/her outside school will be discussed.

School:_____Today's date:_____

Student's name:_____, date of birth:_____

Name of parent/guardian: _____Signature: _____

I am also happy for the project team to receive some general information about my own education and occupation, as I indicate here:

- The highest level of education I completed was: None / Primary / Secondary GCSE/ Secondary A-Level / Post-secondary diploma or vocational education / Undergraduate university degree / Masters / PhD

- If you undertook post-secondary school education, please could you indicate what you studied or specialized in:

_____

-Please could you indicate your current occupation: _____

_____

Head of Faculty: Professor Peter Gronn *Secretary of the Faculty:* Kate Allen
184 Hills Road, Cambridge CB2 8PQ Telephone: +44 (0)1223 767600 www.educ.cam.ac.uk

2.4 Information given to teachers participating of the study

UNIVERSITY OF CAMBRIDGE
Faculty of Education

Participant Information Sheet for Teachers
Research Project: "Learning to learn in different cultures"

What is the project about? The learning to learn in different cultures project is a doctoral study from the Faculty of Education, University of Cambridge. It studies how different cultures (Chilean and English) may have different effects on how students learn to become good learners. Students who become good learners also become good problem solvers and develop an ability to adapt to changes in their contexts of living. Your participation and that of your students would help the researcher to understand how this capacity could be enhanced considering the specificities of different cultures.

What would the research and my students' participation involve? The PhD researcher would be a teacher assistant in your classroom for two weeks. Within this period, we would like your students simply to participate as part of the class as they usually do for 3 hours of video-recorded literacy lessons. Six students from the classroom would be invited to become further involved by being video recorded at closer range in their learning activities during the same 3 hours of literacy lessons. These six students would also carry out an individual 45 minute cube assembly task and participate in a 45 minute group interview. Both these activities would occur outside the classroom. The cube assembly task looks at how they apply their learning to learn capacities. The group interview explores their motivational beliefs for learning to learn. The PhD researcher would also ask these six students about any help they might get from outside the school in their learning, such as who helps them, what about, and how, so it is possible to consider this as part of their developmental support as well.

What about parent's consent? The way parental consent is obtained may vary from classroom to classroom, according to what each teacher or head teacher might think is appropriate. If no special requirements are made the following procedure will be followed: All parents will be informed about the research. Some parents will receive an invitation for their children to take an active part in the research activities (in order to include six students). Parents of those students who are not invited or do not give consent for their children to become part of this group of six will have the chance to opt out of the video-recording of the study. In the case of opt outs, these students will be excluded from camera shots or their faces will be blurred so no one outside the research team can see them in the video.

Who can I contact if I have any questions or concerns? If you have any questions or concerns please contact the PhD researcher, Pablo Torres (pelt2@cam.ac.uk), in the first instance. If this is unsuccessful or inappropriate please contact Dr. David Whitebread (dgw1004@cam.ac.uk) or Dr. Ros McLellan (rwm11@cam.ac.uk), supervisors of this research project. Please keep this sheet for yourself and, if you would like to form part of the project, fill out and return the accompanying Participant Consent Form.

Yours sincerely,

Pablo Torres
PhD (c) researcher

Dr. Ros McLellan
Lecturer in Psychology & Education

Dr. David Whitebread
Senior Lecturer in Psychology & Education

2.5 Consent forms filled in by teachers participating of the full study

UNIVERSITY OF CAMBRIDGE
Faculty of Education

Teachers' Participant Consent Form

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Study: **"Learning to learn in different cultures"**

- Thank you for considering taking part in this research.
- You and your students will be participating anonymously. This means that none of the information collected about you or your students will be linked to any name or school in any published or public setting.
- Even if you sign the consent form you can ask to withdraw from the study at any time. You would not need to give any explanation.
- The audios and video-recordings will only be used for the purposes of research in an academic context. They will be available only to the researcher, the supervision team or other professionals/researchers involved directly in the research project. They may be shown to other professionals only as part of the dissemination of the research and promotion of learning to learn abilities and this would imply no negative consequences for the participants.
- Any audio or video-recording will be securely kept and eventually destroyed according to the research policies of the Faculty of Education of the University of Cambridge.

If you would like to take part of this project, please read the following statement and fill in the required information:

I have read the information sheet and I have had the opportunity to ask questions about it and any question that I have asked has been answered to my satisfaction. I consent voluntarily to participate in this study by allowing the researcher to help my students and me in the classroom, video record 3 hours of literacy lesson, conduct a series of interviews about the recorded lessons, interview me about some personal beliefs related to teaching-learning, perspectives on personal values, and some aspects of the school such as values, norms, and teaching-learning perspectives.

School:_____ Today's date:_____

Name:_____ Year 4, class name: _____

Years of teaching experience:_____ Signature:_____

Head of Faculty: Professor Peter Gronn *Secretary of the Faculty:* Kate Allen
184 Hills Road, Cambridge CB2 8PQ Telephone: +44 (0)1223 767600 www.educ.cam.ac.uk

3 APPENDIX 3 - ORIGINAL SBOS

The tasks require visuo-spatial and analytic abilities. In the cube-assembly task, each student was asked to perform, within a specified time limit, a series of 12 tasks. Thirty cubes, of 2.5 cm acme each, with three different colour sides were given to each student. Different cards presented gradually more difficult models to be constructed by the student, from simpler black and white models to more complicated coloured models. The child had to observe, analyze, and reproduce the model depicted in each card. Each construction was scored according to the successful combinations of items, namely each successful combination was accredited 1 point. Points were subtracted from the total score for the wrong position or wrong colour of a cube's side. The maximum score that could be obtained from the series of 12 tasks was 179 points.

Students' behaviour while constructing the cube assemblies was video-recorded. The video-recordings will be assessed by two independent observers on the basis of students' verbal and nonverbal behaviours and the rating criteria are listed below. Specific details of the behaviour examined were described in each point of a 4-point Likert-type scale from 1 (indicating rare presence or absence of the behaviour) to 4 (indicating full employment of the behaviour), so that each observer could choose the description that better fitted the student's action throughout the task solution. Each observer attributed 1 score for each item of the SBOS for each task and, therefore, there were 12 scores by 12 tasks. The final score of each student's strategic behaviour was the mean of the two observers' ratings.

Abilities assessed in SBOS

Cognitive Strategic Behaviours

1. Choosing between main and trivial: methodically selecting the substantial elements (e.g., form), ignoring the trivial ones (e.g., colour when it is not needed).
2. Analyzing and combining activities: joining small parts resulting from previous activity to make a meaningful whole.
3. Effective use of models: utilising sufficiently and effectively the card models

Metacognitive Strategic Behaviours

1. Planning: working with a clear plan, using time effectively.
2. Monitoring of the activities: examining closely the solution process, selecting appropriate next step.
3. Awareness of errors, adjusting intermediate aims: detecting errors and trying to correct them.

4. Learning from one's own errors: not repeating same errors and taking full advantage of them by using effectively new knowledge.

Motivational/Volitional Strategic Behaviours

1. Concentration: perceives external stimuli but is not distracted by them.
2. Persistence: works persistently in face of difficulties till finding a solution.
3. Working autonomously: works autonomously, needs no intervention or reinforcement by the experimenter.
4. Maintaining motivation: motivates effectively himself/herself and retains interest for the activity.
5. Initiative (starts action on his/her own): shows initiative and high levels of self-activation, decides next step with no need for intervention.

The criteria used for assessing the use of self-regulatory strategies of SBOS

Choosing between main and trivial

1. All elements are considered of equal importance, cannot select the critical elements
2. Confused between trivial and critical parts, sometimes selects the critical elements
3. Often selects the critical elements, not always exploiting them
4. Methodically selects the substantial elements, ignores the trivial ones

Analyzing and combining activities

1. Jumping from item to item
2. Working on parts without referring to the whole
3. Occasional trials in making a combined whole
4. Joining small parts resulting from previous activity to make a meaningful whole

Effective use of model

1. Does not utilise the model at all
2. Uses the model spontaneously without systematic utilisation
3. Uses the model occasionally, mainly when facing difficulties
4. Utilises sufficiently and effectively the model

Planning

1. Approaching the task as trial and error, waste of time
2. Working with a plan only occasionally, usually wasting time
3. Building in gradual steps, however a clear plan is not always apparent
4. Working with a clear plan, using time effectively

Monitoring of the activities

1. Working haphazardly, does not monitor his activities towards the solution
2. Limited monitoring activities of the solution process
3. Stops occasionally, considers or/and adjusts goals
4. Examines closely the solution process, selects appropriate next step

Awareness of errors – adjusting intermediate aims

1. Does not realize errors
2. Superficially perceives that 'something is wrong', does not adjust activity
3. Realizes errors but does not always adjust activity, passes over some of them
4. Full awareness of errors and tries to correct them

Learning from one's own errors

1. Repeats same errors
2. Takes advantage of past errors to a small extent, often repeats same errors
3. Does not repeat same errors but has again difficulty in parts of the activity faced difficulty before
4. Does not repeat same errors and takes full advantage of them by using effectively new knowledge

Concentration

1. Every external stimulus affects concentration and interrupts the solution process
2. Usually has difficulty in concentrating when external stimuli occur
3. Rarely stops due to external stimuli but resumes effort quickly
4. Perceives external stimuli but not affected by them

Persistence

1. Stops the activity in face of difficulties and leaves without completing it
2. Often stops in face of difficulties but returns to after being urged on
3. Show some persistence in the construction process but can abandon it when feels bored before reaching solution
4. Works persistently in face of difficulties till finding a solution

Working autonomously

1. Asks continuously for help or reinforcement/reward
2. Often asks for help or reinforcement (verbal or nonverbal), feels uncertain
3. Occasionally needs reinforcement by the experimenter
4. Works autonomously, needs no intervention or reinforcement by the experimenter

Maintaining motivation

1. Does not have motives for the activity, does not try to motivate himself/herself

2. Easily bored during activity, starts working haphazardly and without interest
3. Tries to keep him/herself in the activity, not always successfully
4. Motivates effectively himself/herself and retains interest for the activity

Initiative (starts action on his own)

1. No initiative, no self-activation
2. Little self-activation, usually asks the experimenter what to do
3. Generally shows initiative with little motivation by the experimenter
4. Shows initiative and high levels of self-activation, decides next step with no intervention

SBOS Scoring Form

Cube Number	Design	Utilization	Follow the path(stopping , checking, comparing, counting ...)	Concentration/ decomposition of attention	Identification of errors- adjustments of individual	Repeatig mistakes	Insistence upon terminatio n (or stop in difficulty)	Autonomy in the solution	Conservation Incentives - Self Mobilizati on	Choice between essential - minor problem	Analyzes & combines individual data to make sense as a whole	Initiative - Level of activity
3A												
4A												
10A												
29A												
20B-2X2X2												
20B-3X3X3												
21B												
29B												
32B												
20C-2X2X2												
20C-3X3X3												
21C												

Use the scoring criteria (1-4) to analyze above data
Name of child:
Judgment:
Specific comments

4 APPENDIX 4 - SBOS II

Please give a "9" if a criteria does not seem to apply. Each score level description should be seen as the minimum standard of that level. Hence if a child behaviour is midway between two consecutive levels (2and3) the lowest level (2) should be granted.

EFFECTIVE METACOGNITIVE STRATEGIES

Awareness of errors (here please consider reflections and changes of misplaced cubes as indicative of awareness)

1. Realizes about none or a very small number of errors (consider this level even if child incurs in one mistake and is unaware of it)
2. Passes over most errors, realizes only about some of them OR feels like something is wrong but does not know exactly what
3. Realizes about most errors, passes over only a few of them
4. Full awareness of errors (note: student may not know how to control all the errors, but is still aware of them).

Effective control of problems (such as mistakes, challenges, ambiguities, etc.)

1. When is aware of problems, does not know how to solve them, at times not even trying
2. When is aware of problems, tries to adjust activity/goals, but most of the time ineffectively/unsuccessfully
3. When is aware of the problem, tries to adjust activity/goals, and is effective/successful most of the time
4. When is aware of problems is always able to adjust activity/goals effectively reaching success

(META)COGNITIVE STRATEGIES

Use of model

1. Does not use the model at all
2. Uses the model only occasionally between building moves
3. Uses the model frequently between building moves
4. Utilises the model almost every time between building moves

Monitoring - coded on building done before reaching any tentative final product (monitoring: involves considering current progress of building, building strategy, and/or reviewing the interpretation of goals, in order to advance towards the final solution)

1. Does not monitor his building activities towards the solution

2. Limited monitoring of building activities towards the solution
3. Stops occasionally to monitor building activities towards the solution
4. Examines frequently the building activity towards the solution

Planning before (building)

1. Child does not show any attempt to plan before starting to build
2. Child shows some signs of planning by stopping to examine the card-model, before building but does it extremely briefly (glance or 1 to 2 sec.)
3. Child shows clear signs of planning by stopping to examine the card-model, does it for 3 to 4 seconds
4. Child shows substantial level of planning, allowing a longer period to think about the figure before building starts

Planning during (order) - as seen throughout building

1. Approaching the task as trial and error
2. Working with a plan only occasionally
3. Most of the time seems to work with a clear plan
4. Working with a clear plan

Use of building strategies

1. No strategies used
2. Using one type of strategy at least once
3. Using two types of strategy at least once each
4. Using more than two types of strategies at least once each

Evaluation (when finished the whole, not the parts)

1. Does not evaluate at all
2. Evaluates but only through a quick glance(s), either at the built figure, the goal model, or both.
3. Evaluates with more detention, but does it not using the model as a reference for evaluation.
4. Evaluates like in level 3, plus it uses the model card to support his/her evaluation.

SOCIAL STRATEGIES

Asking for clarification

Please count the number of times a student asks for "autonomy enabling" clarifications which clarify the goal, rules, materials or time of the task (different from those that ask for clues of how to build something). Please report it as 0, 1, 2, 3, etc.

1. Asking for help (reversed 'working autonomously'; here please consider the student asking for general goal clarifications as a sign of autonomy, but as assistance seeking when child asks for clues or opinions of what he/she has built).
2. Works autonomously, does not seek assistance, reinforcement or evaluation by the experimenter
3. Occasionally seeks assistance, reinforcement or evaluation by the experimenter
4. Often asks for assistance, reinforcement or evaluation (verbal or nonverbal), feels uncertain
5. Asks continuously for assistance or reinforcement/evaluation

MOTIVATION

Concentration

1. Every external stimulus or self-distraction affects concentration and interrupts the solution process
2. Usually has difficulty in concentrating when external stimuli occur or self-distracts
3. Rarely stops due to external stimuli or self-distraction but resumes effort quickly
4. Perceives external stimuli but not affected by them or does not self-distract

Maintaining motivation (code at all times, regardless of the level of challenge)

1. Does not have motives for the activity, does not try to motivate himself/herself
2. Easily bored during activity, starts working without interest
3. Tries to keep him/herself in the activity, not always successfully
4. Motivates effectively himself/herself and retains interest for the activity

Effort (or re-thinking/ re-doing a building part)

1. Child does not put effort into building, either because he decides not to persist or because it does not seem needed
2. When some level of effort seems required, child shows persistence but only occasionally/or done with low intensity
3. When some level of effort seems required, child shows persistence frequently/or done with mid level of intensity
4. When some level of effort seems required, child shows persistence consistently/or done with high intensity

SELF-REGULATED LEARNING

Learning from errors (within task) (Applies only when a particular type of error is made, and child has fixed it at least once, and is likely to face it again in the same task later – does not apply when error is made at the very last building move).

1. Systematically repeats same errors he/she fixed once before

2. Takes advantage of past fixed errors to a small extent, repeats/passes over same errors at least a few times
3. Does not repeat same errors, but achieves this by applying the same strategy he/she applied before, only more carefully)
4. Does not repeat same errors, considers them to improve the way of building, changing building strategy to a better and accurate one.

TASK PERFORMANCE

Challenge level

1. Too easy for student (does not need to pause to think about it)
2. Low level of difficulty, requiring the student to think but to a limited extent (few pauses to think about it or high frequency of micro-pauses)
3. Appropriate level of difficulty, requiring the student to think to a fair level of complexity (frequent pauses to think about it mostly with successful outcomes)
4. High level of difficulty, requiring the student to think to a level of complexity that seems to push or even go beyond his/her capacity (frequent pauses mostly with non successful outcomes)

Final task accuracy (considering only what was visible for the child, do not consider as inaccurate when children do not align the cubes perfectly)

1. Very different from card model
2. Figure with many mistakes but still similar to the card model
3. Figure with a few mistakes
4. Identical figure to card model

SBOS II SCALE INDIVIDUAL CHILD'S RATING

Name: School(initials): Country:

Model	Use of model	Monitoring	Awareness of errors	Plan before	Plan during (order)	Effective control of problems	Learning from errors (within task)	Use of building strategies	Asking clarifications	Evaluation	Concentration	Motivation	Effort	Asking for help	Challenge	Final task accuracy
3A																
4A																
10A																
29A																
20B-2X2X2																
20B-3X3X3																
21B																
29B																
32B																
20C-2X2X2																
20C-3X3X3																
21C																
41B (Extra)																

Supporting Notes SBOS II

These notes contain directions for those scales for which good levels of inter-rater reliability could be more difficult to achieve.

Use of model

Please consider there are tasks with varied length within the Cube Assembly Task. Therefore the level of frequency should not be considered by counting the number of times the student looks at the card model but according to the level of consistency (or periodicity) of model usage between the child's moves. Building moves should be understood as a continuous building activity that seem to be linked to a specific building purpose. Some times this purpose might be to put one cube, some other times it might be to put two to three cubes at once. The coder would need to interpret what can be considerable as a one move for the specific student under study. Sometimes students do not check the model because they either have developed a good working memory and they do not need it or the model is very easy and does not require to much checking of the model. Sometimes a student might not check the model more than at the beginning and reach perfect results, but he/she should still be coded as No using the model, as we this scale does not measure a "sufficient use of the card model" but its observable use.

Level 1: Consider this when looks at the model quickly before building but then builds from memory

Level 2: Uses the model only occasionally: consider a few times between moves while building

Level 3: Uses model frequently; consider as with certain frequency but not consistently (e.g. looks at it frequently at the beginning and then does not refer to it with similar frequency in the last part of the model).

Level 4: Utilizes almost every time or quite consistently in the use of the model between moves

Monitoring

This includes behaviors such as Non verbal indications such as Pauses, Assessments, or Checking, as well as verbal indications, such as Talking about the level of difficulty of the task. Typically it can be seen when students observe their own built figure trying to figure out any problems with it. They might do this by looking at the built figure in isolation or in conjunction with the card model. Student can monitor their building products as well as the goal or building strategy they are following. Remember this code should be understood as checking the current progress of the built model, a building strategy or reviewing the interpretation of task goals. It differs from simply checking the card-model (use of model), it only includes this type of checking when the card model is consulted in order to assess what has been already built and not when is

consulted to exclusively guide next steps. Monitoring is more centered on the child assessing his/her progress, hence has its centre on the built figure.

Awareness of errors

Please code this aspect considering the number of errors the student does not realize about. This code should not be confused with final accuracy of the building (which could be rated considering those errors not fixed by the child), but should be coded considering any errors made (fixed and not fixed) throughout the whole building process. So the awareness of errors should be rated with reference to all the errors incurred during the building process. A child may become aware of the errors right at the end of the building process or during the building process, in either case one can consider them to be aware of such errors.

Planning before building

This scale tries to capture the actions the student does before positioning any cube with building intentionality. If a student has a little glance before positioning a couple of cubes together in a way that seems clearly as building towards the figure, then any other pause to have a look at the card model or count cubes from the card model after that building move should not be considered as planning before building. Those subsequent examinations of the card model may be indicative of other scales, such as use of model, monitoring, strategic building or even challenge.

Planning throughout the task

Here we consider the level to which students seems to deploy a plan in relation to the building order or in relation to other considerations required for the successful building of specific figures (like gravity when building figure 29A). Students have their own way of building, so as long as one could see a systematic order in the way of building, one could assume a plan is being deployed.

Effective control of problems

Code considering as successful what is needed for perfect completion of task. If student fixes a part that does not really exists in the model, code as unsuccessful if he/she does not realize about its inexistence while fixing problems around it. If student focus on parts that cannot be seen from the card model, assume symmetrical building as successful. Please judge based on a problem/difficulty the student faces, not just smooth checks. (errors, challenges and ambiguities). Consider counting cubes as solving problems, even though it might look like a smooth check. Do not consider something as a problem if it is not clear what the child is trying to solve.

Do not consider something as a problem if it is not an absolutely clear problem (for example if the student just takes longer to think about his/her next step). Problems can refer to one cube or

the whole figure, code the effectiveness of control considering how the student solves the particular problem he/she seems to be engaging with, regardless of how big the problem may be. All problems have the same value in this scale. Sometimes asking questions to the researcher may count as indicative of problem, we code how the kid solves the communicated problem. If student control the same number of problems successfully and unsuccessfully, then code level 2. If the student is controlling colour or size and does control correctly only some of the cubes involved in the problem then consider it as unsuccessful. When a student fixes the same problem more than once and does this fixing one immediately after the other - in a row- (i.e. no building interruptions between the fixings) then we consider that as one and the same controlling behaviour, hence we code considering the whole. But, when a student fixes the same problem more than once and does it in different moments (with a building interruption in between fixings) then we consider those as different controlling behaviours, hence we code each individual controlling behaviour separately.

Learning from errors

Consider cubes as misplaced (error) only after the "cube arranging" stage for that specific cube has finished. With the student considering the cube as settled for around one second or so. If the student fixes and then repeats the same type of error (e.g. wrong color) then consider 1 or 2 as possible rating, even if the errors are fixed later on during the building process or the student does not repeat errors in other types of building aspects (e.g. shape or size). This indicator is applied when one can see the child has incurred in any type of error during the building and has become aware of it by fixing it at least once. So this should be coded following closely each *type* of error from the first time that it is incurred within the task until the end of the task. Types of errors include: placing cubes in the wrong colour pattern, include more or less cubes than needed, or build the shape in an inaccurate way. On the other hand, one can see when students learn from their errors, because they lower their error making. There are different extents to which a student can learn from his/her errors:

> Level 1: A student does not show any sign of learning from his/her fixed errors. One can see this when students, having had fixed a particular type of error (colour, number of cubes, or shape of figure), keep making the same type of error constantly or almost always afterwards. When this happens a level "1. Systematically repeats same errors" should be coded.
>
> Level 2: When they are able to control their errors to some degree, but still repeat the same type of error at least once. When this happens a level 2 should be granted (Takes advantage of past errors to a small extent, (can) often repeat/pass over some (type) of errors).

Level 3: A somewhat middle-high level of learning can be seen when the student completely stops making the same type of error by being more careful in his/her building. Here a level "3. Does not repeat same (type) of errors, achieves this by applying the same strategy he/she applied before, only more carefully" should be granted.

Level 4: Finally, the highest level of learning occurs when a student stops making the same type of error by re-thinking the way he/she is building, making it less error prone for that specific type of error. When this happens, a level "4. Does not repeat same (type of) errors, considers them to improve the way of building, changing building strategy to a better and accurate one" should be given. Students may achieve this by applying a concrete or abstract level of re-thinking. Concrete level of thinking creates new strategies that are simpler to arrive to, whereas more abstract ones arrive to new strategies that seem more difficult to have arrived to. A level 4a would be granted when the former happens, and a level 4b when the latter happens.

Different types of errors (cube colors, number of cubes, or shape of figure) can occur when building a particular task. For the purposes of this coded variable, the type of error where the student has achieved most learning is considered. So if the student makes a continuous mistake in relation to colour, but learned to a high level in relation to shape, then only shape should be considered for learning purposes. This way the students' potential is considered and not only his/her average performance.

NA or 9: Does not apply if student does not fix any error before his/her last building movement.

Level 1: Frequently repeats same type of error (in relation to color, shape, or size)

Level2: Repeats the same type of error at least once. (consider even if student repeats an error in only <u>one type</u> of error and not others)

Level 3: Does not repeat any type of error at all, by just being more careful in the applied method he/she has been using.

Level4: Does not repeat any type of error at all, by changing building strategies (method).

Use of building strategies

This scale does not measure the level of effectiveness of the applied strategies, but the extent to which students applies a variety of strategies. Consider the following set of strategies to code this indicator:

Using one side as a reference to build the rest of the figure

Counting cubes in either card model or built figure explicitly

Sorting colours of all or many cubes before start building the figure

Building moving around structures from previously built models (a conglomerate of three cubes qualifies as a structure)

Builds in a jigsaw manner, putting together structures he/she has been building for the model

Asking for clarifications

It refers to questions asked to the researcher by the students so he/she can understand better what is required for the task, such as goals, resources and rules involved. This types of clarification enable the autonomy of the student. Typical questions are about whether they need to imagine the back of the card models, if they could do the model upside down, how long they have left, how many cubes are there in total, and the like.

Evaluation

This code refers to the level at which students review their final product. As this code is not assessing the effectiveness of evaluation, a high level evaluation does not require the students to realize about all their errors or arrive to a perfect accurate building solution. Evaluations can take a fraction of a second or can be much more thorough. A level "1. Does not evaluate" is given when students finish their building without even having a glance at the figure they built, assuming it has been achieved all right. A level "2. Evaluates but only through quick glance(s), either to the built figure, the goal model or both" should be granted when a student has a brief glance to evaluate the built figure, the glance can be either only to the built figure or to both the built figure in conjunction with the goal model. Here the student does not even check the sides that he/she cannot see from his/her seat. This level it is mostly characterized by the students looking quickly to the figure and/or the goal model for the purposes of a non-thorough evaluation. This might sometimes be a disputable action some people might not consider evaluation, but which at least, superficially, might be interpreted as one.

Higher levels of evaluation are granted when the student takes a little of more time to evaluate. A level "3. Evaluates with more detention, but does not use the model as a reference for evaluation", should be granted when students look at the built figure at least bit more thoroughly, if not more than a bit. For example, the child might check some sides they might not be able to see easily (if relevant to the building for them), or simply they take more than just a quick glance to evaluate. It is clearly and evaluation action. Here the student does not to use the goal model as a reference, relying on his/her memory about it to evaluate. Level 4: Students that look parts that the can not see from where they are seating or who evaluate looking at specific details/parts of the model (like in level 3) but who also use the goal model as a support tool in order to do this.

Effort

Only consider there is effort when student needs to re-think about a part of the building or re-does it. Do not consider as effort simply when you see that the student takes his/her time to think about something (which may be monitoring, or thinking about how to control a difficulty or error as he/she usually requires while building), but more when he/she seems to be having second thoughts or second goes at things that are more difficult than his/her usual stream of building, requiring him or her to persist. So code 1 when no incident like this is observed. When there are possible problems where the students might need to persist, then consider 1 when you do not see him/her persist, or 2 to 4 when you see him/her persisting to some degree. There are two possible criteria to assess persistence: Frequency and intensity. When the student faces many challenges during the specific tasks please apply the frequency criteria. If the student only face one or two challenges, then consider the intensity criteria. Sometimes a problem does not require to much intensity to be solved correctly, so please bear in mind the distinction between intensity and level of success.

Challenge

This code tries to capture the challenge zone at which the children are working. The spectrum of challenge levels try to determine the level of challenge not as the observer would determine for the task in isolation but for the task in particular to the particular child as seen through his/her engagement with that task. Hence, a task can seem to be of low challenge for the student and still be carried out incorrectly, or be of high challenge and be carried out correctly. It is not the level of building accuracy (final performance) that determines the level of challenge, but the difficulties that are consciously encountered throughout the building process by a specific child.

When the child seems to do the tasks very quickly and with out the need to stop to think about his/her actions, even for fractions of seconds, then this would be indicative of no challenge for him/her, and therefore would be considered as "1. Too easy for student". When child stops at some points, even for fractions of seconds to think about the task, this might be indicative of some level of difficulty to the student, which even though might not be considered "challenging" shows some need to deploy thinking resources. Here a level "2. Low level of difficulty, requiring the student to think but to a limited extent" would be the most adequate coding.

An appropriate level of difficulty, or a level 3, reflect what one might call a challenging enough task. This level should be granted when the child has had to invest more than just a few short pauses to overcome the problem, and seems as if he/she is requiring to deploy a fair amount of cognitive resources to carry it out. Note the level of difficulty here seems to fit the students current level of ability, as it seems to fit somewhere between his/her zone of development and his/her *immediate* zone of proximal development. A level "4. High level of difficulty, requiring the student to think to a level of complexity that seems to (push or even) go beyond his/her

capacity", might be considered when a student is working at a highly challenging level as well as to a level that is so difficult that is not even contingently challenging any more. The student might still be able to arrive to an accurate answer, but in order to do so would need to be persistent and creative, in which case he/she would be considered as having worked at a more distal zone of proximal development. This level would also be granted when the student could not even finish the task because of its difficulty.

5 APPENDIX 5 – CHECKING OF STATISTICAL ASSUMPTIONS

5.1 Checking data distribution

5.1.1 Normality checks

5.1.1.1 Normality checks of self-regulatory behaviours (disaggregated version)

The normality of distributions of disaggregate ratings of self-regulatory behaviours (including the 11 to 13 ratings given to each child for each behavioural scale applied) was checked applying a Shapiro Wilk test within each country sample. The tables show that most self-regulatory behaviours are not normally distributed (see in bold behavioural measures distributing normally).

English sample

Shapiro-Wilk W test for normal data - English sample - Self-regulatory behaviours (desegregate values)

Variable	Obs	W	V	z	Prob>z
Use of model	315	1.00	0.38	-2.26	**0.987***
Monitoring	315	1.00	1.06	0.14	**0.442***
Awareness of errors	206	0.98	3.51	2.89	0.002
Planning before	315	1.00	0.51	-1.57	**0.941***
Planning during (order)	315	0.95	10.43	5.52	0.000
Effective control of problems	215	0.93	11.17	5.57	0.000
Learning from errors	169	0.99	1.36	0.70	**0.241***
Use of building strategies	315	0.96	9.21	5.22	0.000
Asking for clarifications	315	0.90	23.28	7.41	0.000
Evaluation	308	0.98	5.34	3.94	0.000
Concentration	315	0.70	67.05	9.90	0.000
Maintaining motivation	315	0.61	87.41	10.52	0.000
Effort	315	0.97	6.06	4.24	0.000
Asking for help	315	0.83	37.04	8.50	0.000
Level of challenge	315	1.00	0.95	-0.12	**0.546***
Final task accuracy	315	0.96	9.20	5.22	0.000

*Variables distributing normally

Chilean sample

Shapiro-Wilk W test for normal data - Chilean sample - Self-regulatory behaviours (disaggregate values)

Variable	Obs	W	V	z	Prob>z
Use of model	301	1.00	0.27	-3.05	**0.998***
Monitoring	301	1.00	1.03	0.07	**0.471***
Awareness of errors	213	0.99	1.55	1.02	**0.155***
Planning before	301	0.99	1.78	1.35	**0.087***
Planning during (order)	301	0.96	7.65	4.78	0.000
Effective control of problems	229	0.97	5.19	3.81	0.000
Learning from errors	170	0.99	1.40	0.77	**0.221***
Use of building strategies	301	0.96	8.12	4.92	0.000
Asking for clarifications	301	0.81	40.70	8.70	0.000
Evaluation	296	0.98	3.74	3.09	0.001
Concentration	301	0.60	84.52	10.42	0.000
Maintaining motivation	301	0.67	70.83	10.00	0.000
Effort	301	0.97	6.44	4.37	0.000
Asking for help	301	0.89	23.71	7.43	0.000
Level of challenge	301	1.00	0.26	-3.19	**0.999***
Final task accuracy	301	0.97	6.45	4.38	0.000
Continuous precision throughout task	301	0.99	1.79	1.37	**0.086***

*Variables distributing normally

5.1.1.2 *Normality checks of self-regulatory behaviours (aggregated version)*

The normality of distributions of aggregate ratings of self-regulatory behaviours (averages of the 11 to 13 ratings given to each child within each behavioural scale applied) was checked applying a Shapiro Wilk test within each country sample. The tables show that most self-regulatory behaviours are normally distributed (see p values in bold).

Shapiro-Wilk W test for normal data - English sample - Self-regulatory behaviours (aggregate values)

Variable	Obs	W	V	z	Prob>z
Use of model	25	0.99	0.21	-3.18	**0.999***
Monitoring	25	0.96	1.08	0.16	**0.437***
Awareness of errors	25	0.94	1.63	1.00	**0.160***
Planning before	25	0.96	1.19	0.36	**0.361***
Planning during (order)	25	0.94	1.58	0.93	**0.176***
Effective control of problems	25	0.94	1.68	1.06	**0.145***
Learning from errors	25	0.95	1.44	0.75	**0.226***
Use of building strategies	25	0.96	1.11	0.21	**0.416***
Asking for clarifications	25	0.88	3.34	2.47	0.007
Evaluation	25	0.96	1.11	0.21	**0.417***
Concentration	25	0.66	9.45	4.59	0.000
Maintaining motivation	25	0.33	18.53	5.97	0.000
Effort	25	0.98	0.65	-0.88	**0.810***
Asking for help	25	0.80	5.55	3.50	0.000
Level of challenge	25	0.98	0.52	-1.33	**0.908***
Final task accuracy	25	0.92	2.34	1.74	0.041

*Variables distributing normally

Shapiro-Wilk W test for normal data - Chilean sample - Self-regulatory behaviours (aggregate values)

Variable	Obs	W	V	z	Prob>z
Use of model	24	0.97	0.79	-0.50	**0.690***
Monitoring	24	0.97	0.82	-0.40	**0.656***
Awareness of errors	24	0.96	1.06	0.11	**0.456***
Planning before	24	0.98	0.61	-1.00	**0.842***
Planning during (order)	24	0.97	0.88	-0.26	**0.602***
Effective control of problems	24	0.94	1.64	1.00	**0.158***
Learning from errors	24	0.97	0.71	-0.71	**0.762***
Use of building strategies	24	0.97	0.71	-0.71	**0.762***
Asking for clarifications	24	0.80	5.37	3.43	0.000
Evaluation	24	0.94	1.64	1.00	**0.158***
Concentration	24	0.40	16.16	5.67	0.000
Maintaining motivation	24	0.06	25.48	6.60	0.000
Effort	24	0.93	1.91	1.32	**0.093***
Asking for help	24	0.80	5.30	3.40	0.000
Level of challenge	24	0.92	2.25	1.65	**0.049***
Final task accuracy	24	0.87	3.52	2.57	0.005

*Variables distributing normally

5.1.1.3 Normality checks of achievement motivational attitudes

The normality of distributions of the frequency with which children expressed ideas related to achievement motivational attitude within their interviews was checked applying a Shapiro Wilk test within each country sample. The tables show that most frequencies of achievement motivational attitudes did not distribute normally in either country sample (see p values not in bold).

English sample

Shapiro-Wilk W test of normal distribution - Achievement motivational attitudes - English sample

Achievement motivational attitudes		Obs	W	V	z	Prob>z
Orientations	Effortful learning approach	24	0.99	0.34	-2.22	**0.987***
	Effortful learning avoidance	24	0.93	1.82	1.22	**0.111***
	Performance approach	24	0.96	1.07	0.14	**0.445***
	Performance avoidance	24	0.98	0.46	-1.59	**0.944***
Motives	Learning	24	0.96	1.02	0.03	**0.487***
	Helping others to learn	24	0.60	10.78	4.85	0.000
	Performing high(er)	24	0.80	5.53	3.49	0.000
	Feeling able	24	0.67	8.98	4.48	0.000
	Avoiding feelin unable	24	0.97	0.89	-0.23	**0.591***
	Relate	24	0.98	0.50	-1.42	**0.922***
Goal oriented motives	Effortful learning approach - Learning	24	0.97	0.88	-0.27	**0.607***
	Effortful learning approach - Performing high(er)	24	0.73	7.17	4.02	0.000
	Performance approach - Learning	24	0.83	4.57	3.10	0.001
	Performance approach - Helping others to learn	24	0.72	7.51	4.11	0.000
	Performance approach - Performing high(er)	24	0.79	5.68	3.54	0.000
	Performance approach - Feeling able	24	0.79	5.66	3.54	0.000
	Performance approach - Relate	24	0.97	0.87	-0.29	**0.615***
	Effortful learning avoidance - Avoiding feeling unable	24	0.78	6.03	3.66	0.000
	Performance avoidance - Learning	24	0.54	12.29	5.12	0.000
	Performance avoidance - Performing high(er)	24	0.82	4.91	3.24	0.001
	Performance avoidance - Avoiding feeling unable	24	0.96	1.13	0.25	**0.403***
	Performance avoidance - Relate	24	0.88	3.32	2.45	0.007

*Variables distributing normally

Chilean sample

Shapiro-Wilk W test of normal distribution - Achievement motivational attitudes - Chilean sample

Achievement motivational attitudes		Obs	W	V	z	Prob>z
Orientations	Effortful learning approach	24	0.98	0.41	-1.82	**0.966***
	Effortful learning avoidance	24	0.90	2.75	2.06	0.020
	Performance approach	24	0.96	1.02	0.03	**0.487***
	Performance avoidance	24	0.84	4.28	2.96	0.002
Motives	Learning	24	0.94	1.75	1.14	**0.126***
	Helping others to learn	24	0.88	3.28	2.42	0.008
	Performing high(er)	24	0.86	3.69	2.66	0.004
	Feeling able	24	1.00	0.04	-6.63	**1.000***
	Avoiding feelin unable	24	0.88	3.24	2.39	0.008
	Relate	24	0.96	1.16	0.30	**0.381***
Goal oriented motives	Effortful learning approach - Learning	24	0.99	0.17	-3.60	**1.000***
	Effortful learning approach - Performing high(er)	24	0.87	3.51	2.56	0.005
	Performance approach - Learning	24	0.89	2.84	2.13	0.017
	Performance approach - Helping others to learn	24	0.88	3.28	2.42	0.008
	Performance approach - Performing high(er)	24	0.85	4.10	2.88	0.002
	Performance approach - Feeling able	24	0.84	4.38	3.01	0.001
	Performance approach - Relate	24	0.91	2.36	1.75	0.040
	Effortful learning avoidance - Avoiding feeling unable	24	0.95	1.34	0.60	**0.274***
	Performance avoidance - Learning	24	0.82	4.82	3.21	0.001
	Performance avoidance - Performing high(er)	24	0.84	4.38	3.01	0.001
	Performance avoidance - Avoiding feeling unable	24	0.85	3.94	2.80	0.003
	Performance avoidance - Relate	24	0.89	2.83	2.12	0.017

5.1.2 Checking kurtosis and skewness of self-regulatory behaviours measures

Chilean and English sample

Levels of skewness and kurtosis - Chilean and English sample

Sample	Chilean			English		
Variable	Obs	Skewness	Kurtosis	Obs	Skewness	Kurtosis
Use of model	301	-0.27	1.40	315	-0.32	1.46
Monitoring	301	-0.31	1.96	315	-0.27	1.84
Awareness of errors	213	-0.46	1.70	315	-0.84	**2.16***
Planning before	301	0.21	1.67	315	0.10	1.45
Planning during (order)	301	-1.07	**3.27***	315	-1.30	**3.78***
Effective control of problems	229	-1.00	**2.65***	215	-1.62	**4.27***
Learning from errors	170	-0.02	**2.28***	169	0.15	**2.30***
Use of building strategies	301	0.80	**3.31***	315	0.93	**3.38***
Asking for clarifications	301	**4.62***	**27.91****	315	**2.96**	**11.54****
Evaluation	296	0.49	**2.12***	308	0.54	**2.12***
Concentration	301	**-6.45***	**48.54****	315	**-4.36**	**23.10****
Maintaining motivation	301	**-5.30***	**31.31****	315	**-5.65**	**36.51****
Effort	301	1.04	**2.67***	315	0.96	**2.83***
Asking for help	301	**3.05***	**12.14****	315	**4.34**	**22.76****
Level of challenge	301	0.07	**2.40***	315	-0.33	**2.53***
Final task accuracy	301	-1.07	**2.56***	315	-1.43	**3.46***
Continuous precision throughout task	301	-0.46	**2.32***	315	-0.74	**2.5***

*Mild levels skewness and kurtosis

**High levels of skewness and kurtosis

5.2 Checking variance assumptions

5.2.1 Homogeneity of variance between samples (Levene's tests)

5.2.2.1 Levene´s test - Self-regulatory behaviours (disaggregate values)

Levene's robust test of homogeneity of variance. Self-regulatory behaviours (disaggregate values). Contrast between Chile and England

Variable	Levene's robust statistic W_0	df1	df2	Sig.
Use of model	0.222	1	614	0.638
Monitoring	1.572	1	614	0.210
Awareness of errors	1.155	1	417	0.283
Planning before	1.436	1	614	0.231
Planning during (order)	0.224	1	614	0.636
Effective control of problems	6.009	1	442	**0.015***
Learning from errors	0.002	1	337	0.965
Use of building strategies	0.237	1	614	0.626
Asking for clarifications	7.878	1	614	**0.005***
Evaluation	0.019	1	602	0.891
Concentration	12.030	1	614	**0.001***
Maintaining motivation	0.408	1	614	0.523
Effort	6.238	1	614	**0.013***
Asking for help	16.560	1	614	**0.000***
Level of challenge	0.388	1	614	0.533
Final task accuracy	4.703	1	614	**0.031***

*Non homogeneous variance between samples

5.2.2.3 Levene's test - Self-regulatory behaviours (aggregate values)

Levene's robust test of homogeneity of variance. Self-regulatory behaviours (aggregate values). Contrast between Chile and England

Variable	Levene's robust statistic W_0	df1	df2	Sig.
Use of model	3.164	1	47	0.082
Monitoring	0.927	1	47	0.341
Awareness of errors	0.394	1	47	0.533
Planning before	4.208	1	47	**0.046***
Planning during (order)	2.814	1	47	0.100
Effective control of problems	0.007	1	47	0.934
Learning from errors	0.178	1	47	0.675
Use of building strategies	0.139	1	47	0.711
Asking for clarifications	1.491	1	47	0.228
Evaluation	0.063	1	47	0.802
Concentration	1.653	1	47	0.205
Maintaining motivation	0.090	1	47	0.765
Effort	2.508	1	47	0.120
Asking for help	6.003	1	47	**0.018***
Level of challenge	1.653	1	47	0.205
Final task accuracy	0.229	1	47	0.634

*Non homogeneous variance between samples

5.2.2.5 Levene's test - Achievement motivational attitudes

Levene's robust test of homogeneity of variance. Achievement motivational attitudes. Contrast between Chile and England

Achievement motivational attitude		Levene's robust statistic W_0	df1	df2	Sig.
Orientations	Effortful learning approach	0.139	1	46	0.711
	Effortful learning avoidance	0.227	1	46	0.636
	Performance approach	0.098	1	46	0.756
	Performance avoidance	2.075	1	46	0.157
Motives	Learning	3.590	1	46	0.064
	Helping others to learn	0.450	1	46	0.506
	Performing high(er)	0.304	1	46	0.584
	Feeling able	0.154	1	46	0.697
	Avoiding feelin unable	0.473	1	46	0.495
	Relate	0.452	1	46	0.505
Goal oriented motives	Effortful learning approach - Learning	0.212	1	46	0.647
	Effortful learning approach - Performing high(er)	15.755	1	46	**0.000***
	Performance approach - Learning	0.755	1	46	0.389
	Performance approach - Helping others to learn	1.825	1	46	0.183
	Performance approach - Performing high(er)	0.399	1	46	0.531
	Performance approach - Feeling able	3.361	1	46	0.073
	Performance approach - Relate	3.521	1	46	0.067
	Effortful learning avoidance - Avoiding feeling unable	2.258	1	46	0.140
	Performance avoidance - Learning	13.189	1	46	**0.001***
	Performance avoidance - Performing high(er)	9.514	1	46	**0.003***
	Performance avoidance - Avoiding feeling unable	1.009	1	46	0.320
	Performance avoidance - Relate	1.493	1	46	0.228

*Non homogeneous variance between samples

5.2.3 Multicollinearity checks

5.2.3.1 Correlation matrices of self-regulatory behaviours

The correlation matrices of self-regulatory behaviours were calculated over the disaggregate values of self-regulatory behaviours. Given the non-normality of the data, Spearman rank correlations were computed.

English sample

Correlation matrix (Spearman); Self-regulatory behaviour and performance measures. England.

	Use of model	Monitoring	Awareness of errors	Planning before	Planning during	Effective control of problems	Learning from errors	Use of building strategies	Asking for clarifications	Evaluation	Concentration	Maintaining motivation	Effort	Asking for help
Use of model	1													
Monitoring	-0.07	1.00												
Awareness of errors	-0.12	**0.14***	1.00											
Planning before	**-0.14***	**0.13***	-0.05	1.00										
Planning during (order)	0.11	**-0.21***	**0.27***	-0.11	1.00									
Effective control of problems	**0.19***	0.03	**0.44***	**-0.17***	**0.54***	1.00								
Learning from errors	0.03	0.07	**0.35***	-0.08	**0.49***	**0.52***	1.00							
Use of building strategies	**-0.18***	**0.16***	**-0.14***	**0.30***	**-0.25***	**-0.16***	**-0.16***	1.00						
Asking for clarifications	**-0.14***	**0.14***	0.12	**0.19***	-0.09	**-0.24***	**-0.17***	0.08	1.00					
Evaluation	**0.12***	**0.20***	0.06	-0.03	-0.06	**0.09**	0.08	0.01	-0.06	1.00				
Concentration	0.10	-0.10	-0.08	**-0.14***	**0.17***	**0.15***	0.05	-0.08	-0.07	-0.00	1.00			
Maintaining motivation	**0.13***	0.04	0.09	**-0.18***	**0.36***	**0.38***	**0.26***	-0.09	-0.03	0.09	**0.30***	1.00		
Effort	**-0.22***	**0.40***	-0.09	**0.24***	**-0.38***	**-0.25***	**-0.24***	**0.32***	**0.17***	**0.19***	-0.07	-0.02	1.00	
Asking for help	-0.10	**0.13***	0.01	**0.20***	**-0.21***	**-0.27***	**-0.23***	**0.20***	0.03	0.00	**-0.22***	**-0.20***	**0.20***	1.00

*Statistically significant relationship at p<0.05

Chilean sample

Correlation matrix (Spearman); Self-regulatory behaviour and performance measures. Chile

	Use of model	Monitoring	Awareness of errors	Planning before	Planning during	Effective control of problems	Learning from errors	Use of building strategies	Asking for clarifications	Evaluation	Concentration	Maintaining motivation	Effort	Asking for help
Use of model	1													
Monitoring	0.02	1.00												
Awareness of errors	0.00	**0.34***	1.00											
Planning before	-0.01	**0.17***	-0.03	1.00										
Planning during (order)	0.07	**-0.26***	**0.15***	**-0.12***	1.00									
Effective control of problems	**0.21***	-0.02	**0.49***	-0.05	**0.37***	1.00								
Learning from errors	0.03	0.04	**0.52***	-0.05	**0.37***	**0.51***	1.00							
Use of building strategies	**-0.17***	**0.21***	0.04	**0.19***	**-0.13***	-0.02	**0.16***	1.00						
Asking for clarifications	-0.03	**0.11***	0.08	0.11	0.01	-0.11	0.07	0.07	1.00					
Evaluation	-0.04	**0.20***	**0.18***	-0.05	-0.05	-0.07	-0.10	0.02	0.05	1.00				
Concentration	0.11	-0.02	-0.09	**-0.14***	-0.05	-0.07	-0.03	-0.07	0.04	0.01	1.00			
Maintaining motivation	**0.14***	**0.24***	**0.33***	0.07	0.003	**0.23***	**0.21***	**0.15***	0.05	**0.12***	-0.03	1.00		
Effort	**-0.20***	**0.46***	**0.14***	0.10	**-0.48***	**-0.24***	**-0.25***	**0.27***	**0.20***	**0.20***	0.00	0.10	1.00	
Asking for help	-0.08	0.06	-0.05	**0.22***	-0.05	**-0.20***	-0.04	0.05	**0.41***	0.07	0.06	-0.05	**0.12***	1.00

*Statistically significant relationship at p<0.05

5.2.3.2 Variance inflation factors (VIFs) and Tolerance values

As shown in the tables below, all VIFs and Tolerance values were appropriate. This indicates that multicollinearity was not an issue within either sample. Please note that the tests were carried out over the most disaggregate data sets, as these were the data sets used for all regressions and factor analyses. This meant that tests were calculated considering repeated frequencies of achievement motivational attitudes (11 to 13 times per child, to match the 11 to 13 ratings of self-regulatory behaviour).

English sample

Testing for multicollinearity - English Sample

Variable		VIF	SQRT VIF	Tolerance	R- Squared
Orientations (n=312)	Effortful learning approach	1.09	1.04	0.9201	0.0799
	Effortful learning avoidance	1.17	1.08	0.8579	0.1421
	Performance approach	1.10	1.05	0.9061	0.0939
	Performance avoidance	1.03	1.01	0.9743	0.0257
Motives (n=312)	Learning	1.60	1.26	0.6257	0.3743
	Helping others to learn	1.09	1.04	0.9166	0.0834
	Performing high(er)	1.56	1.25	0.6414	0.3586
	Feeling able	1.38	1.17	0.7249	0.2751
	Avoiding feelin unable	1.71	1.31	0.5835	0.4165
	Relate	1.68	1.30	0.5945	0.4055
Goal oriented motives (n=312)	Effortful learning approach - Learning	2.51	1.58	0.3988	0.6012
	Effortful learning approach - Performing high(er)	1.78	1.33	0.5620	0.438
	Performance approach - Learning	1.64	1.28	0.6112	0.3888
	Performance approach - Helping others to learn	2.03	1.43	0.4923	0.5077
	Performance approach - Performing high(er)	2.10	1.45	0.4761	0.5239
	Performance approach - Feeling able	1.81	1.34	0.5538	0.4462
	Performance approach - Relate	3.18	1.78	0.3141	0.6859
	Effortful learning avoidance - Avoiding feeling unable	1.92	1.38	0.5215	0.4785
	Performance avoidance - Learning	1.44	1.20	0.6966	0.3034
	Performance avoidance - Performing high(er)	1.73	1.31	0.5790	0.421
	Performance avoidance - Avoiding feeling unable	2.55	1.60	0.3921	0.6079
	Performance avoidance - Relate	1.90	1.38	0.5275	0.4725
Self-regulatory behaviours (n=147)	Use of model	1.18	1.09	0.8492	0.1508
	Monitoring	1.25	1.12	0.7991	0.2009
	Awareness of errors	1.61	1.27	0.6229	0.3771
	Planning before	1.19	1.09	0.8392	0.1608
	Planning during (order)	2.02	1.42	0.4951	0.5049
	Effective control of problems	2.51	1.59	0.3976	0.6024
	Learning from errors	1.61	1.27	0.6222	0.3778
	Use of building strategies	1.32	1.15	0.7583	0.2417
	Asking for clarifications	1.47	1.21	0.6799	0.3201
	Evaluation	1.22	1.11	0.8171	0.1829
	Concentration	1.16	1.08	0.8641	0.1359
	Maintaining motivation	1.59	1.26	0.6289	0.3711
	Effort	1.51	1.23	0.6629	0.3371
	Asking for help	1.43	1.2	0.6974	0.3026

*Indicating problems with multicollinearity (VIF>10 or Tolerance<0.1)

Chilean sample

Testing for multicollinearity - Chilean Sample

Variable		VIF	SQRT VIF	Tolerance	R- Squared
Orientations (n=310)	Effortful learning approach	1.29	1.14	0.7728	0.2272
	Effortful learning avoidance	1.14	1.07	0.8803	0.1197
	Performance approach	1.24	1.11	0.8094	0.1906
	Performance avoidance	1.02	1.01	0.9795	0.0205
Motives (n=310)	Learning	1.17	1.08	0.8543	0.1457
	Helping others to learn	1.17	1.08	0.8560	0.1440
	Performing high(er)	3.53	1.88	0.2834	0.7166
	Feeling able	3.40	1.84	0.2942	0.7058
	Avoiding feelin unable	1.89	1.37	0.5303	0.4697
	Relate	1.06	1.03	0.9455	0.0545
Goal oriented motives (n=310)	Effortful learning approach - Learning	1.61	1.27	0.6213	0.3787
	Effortful learning approach - Performing high(er)	1.43	1.20	0.6981	0.3019
	Performance approach - Learning	1.82	1.35	0.5495	0.4505
	Performance approach - Helping others to learn	1.66	1.29	0.6039	0.3961
	Performance approach - Performing high(er)	4.44	2.11	0.2251	0.7749
	Performance approach - Feeling able	2.10	1.45	0.4753	0.5247
	Performance approach - Relate	2.43	1.56	0.4109	0.5891
	Effortful learning avoidance - Avoiding feeling unable	3.69	1.92	0.2708	0.7292
	Performance avoidance - Learning	2.06	1.43	0.4857	0.5143
	Performance avoidance - Performing high(er)	3.03	1.74	0.3298	0.6702
	Performance avoidance - Avoiding feeling unable	1.85	1.36	0.5412	0.4588
	Performance avoidance - Relate	3.32	1.82	0.3012	0.6988
Self-regulatory behaviours (n=161)	Use of model	1.2	1.09	0.8361	0.1639
	Monitoring	1.46	1.21	0.683	0.317
	Awareness of errors	1.87	1.37	0.5351	0.4649
	Planning before	1.28	1.13	0.7812	0.2188
	Planning during (order)	1.48	1.22	0.6745	0.3255
	Effective control of problems	1.76	1.33	0.5671	0.4329
	Learning from errors	1.92	1.38	0.522	0.478
	Use of building strategies	1.32	1.15	0.7601	0.2399
	Asking for clarifications	1.28	1.13	0.7798	0.2202
	Evaluation	1.1	1.05	0.9065	0.0935
	Concentration	1.11	1.06	0.8969	0.1031
	Maintaining motivation	1.12	1.06	0.8968	0.1032
	Effort	1.79	1.34	0.5587	0.4413
	Asking for help	1.32	1.15	0.7586	0.2414

*Indicating problems with multicollinearity (VIF>10 or Tolerance<0.1)

5.4 Other regression assumptions

5.4.1 Checking independence of irrelevant alternatives (IIA)

Hausman tests (seemingly unrelated estimation based) were conducted in order to ensure that the likelihood of a child demonstrating a level 1, 2, 3, or 4 of a particular behaviour did not depend on the way the scale was constructed (e.g., the existence of a level 2 affecting the extent to which a level 3 or 4 was granted). Meeting this assumption allows for the conduction of more precise estimations. Basically meeting the assumption permits to say that any significant effect found from a group of independent variables over the odds of children showing a certain level of a self-regulatory behaviour (relative to the level 1 or 2 within this study) is independent from the chances of assigning one level rather than another because of how the scale is design.

5.4.2 Self-regulatory behaviours on final task accuracy

English sample

Hausman test (seemingly unrelated estimation based)

Dependent variable tested: *Final task accuracy (N=301)* Set of independent variables tested: Self-regulatory behaviours	chi2	df	Sig.
Level 1 DV	3.282	26	1.000
Level 2 DV	12.242	26	0.990
Level 3 DV	8.245	26	1.000
Level 4 DV	23.322	26	0.615

*p<0.05 indicating violation of IIA assumption.

Chilean sample

Hausman test (seemingly unrelated estimation based)

Dependent variable tested: *Final task accuracy (N=301)* Set of independent variables tested: Self-regulatory behaviours	chi2	df	Sig.
Level 1 DV	15.569	26	0.946
Level 2 DV	18.359	26	0.862
Level 3 DV	20.609	26	0.762
Level 4 DV	8.220	26	1.000

*p<0.05 indicating violation of IIA assumption.

5.4.4 Goal oriented motives on effort

English sample

Hausman test (seemingly unrelated estimation based)

Dependent variable tested: *Effort (N=302)* Set of independent variables tested: Goal oriented motives	chi2	df	Sig.
Level 1 DV	10.779	28	0.999
Level 2 DV	7.611	28	1.000
Level 3 DV	12.673	28	0.994
Level 4 DV	6.435	28	1.000

*p<0.05 indicating violation of IIA assumption.

Chilean sample

Hausman test (seemingly unrelated estimation based)

Dependent variable tested: *Effort (N=301)* Set of independent variables tested: Goal oriented motives	chi2	df	Sig.
Level 1 DV	13.653	28	0.989
Level 2 DV	7.688	30	1.000
Level 3 DV	10.353	29	0.999
Level 4 DV	8.726	29	1.000

*p<0.05 indicating violation of IIA assumption.

5.4.5 Goal oriented motives on awareness of errors

English sample

Hausman test (seemingly unrelated estimation based)

Dependent variable tested: *Awareness of errors (N=197)* Set of independent variables tested: Goal oriented motives	chi2	df	Sig.
Level 1 DV	4.25E+08	28	0.000
Level 2 DV	9021.377	26	0.000
Level 3 DV	6.157	27	1.000
Level 4 DV	1329.403	26	0.000

*p<0.05 indicating violation of IIA assumption.

Chilean sample

Hausman test (seemingly unrelated estimation based)

Dependent variable tested: *Awareness of errors (N=213)* Set of independent variables tested: Goal oriented motives	chi2	df	Sig.
Level 1 DV	4.55E+00	26	1.000
Level 2 DV	11.059	26	0.995
Level 3 DV	10.297	26	0.997
Level 4 DV	11.130	26	0.995

*p<0.05 indicating violation of IIA assumption.

5.4.6 Goal oriented motives on planning during (order)

English sample

Hausman test (seemingly unrelated estimation based)

Dependent variable tested: *Planning during (order) (N=292)* Set of independent variables tested: Goal oriented motives	chi2	df	Sig.
Level 1 DV - excluded	na	na	na
Level 2 DV	4.235	14	0.994
Level 3 DV	5.485	14	0.978
Level 4 DV	5.860	14	0.970

*p<0.05 indicating violation of IIA assumption.

Chilean sample

Hausman test (seemingly unrelated estimation based)

Dependent variable tested: *Planning during (order) (N=291)* Set of independent variables tested: Goal oriented motives	chi2	df	Sig.
Level 1 DV - excluded	na	na	na
Level 2 DV	4.020	15	0.998
Level 3 DV	1.688	15	1.000
Level 4 DV	2.965	15	1.000

*p<0.05 indicating violation of IIA assumption.

5.4.7 Goal oriented motives on asking for help

No need to check given the amount of used values within the scale (i.e. 2).

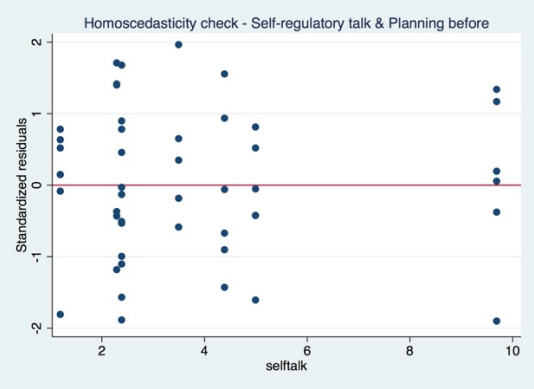
5.5 Checking of multilevel model assumptions

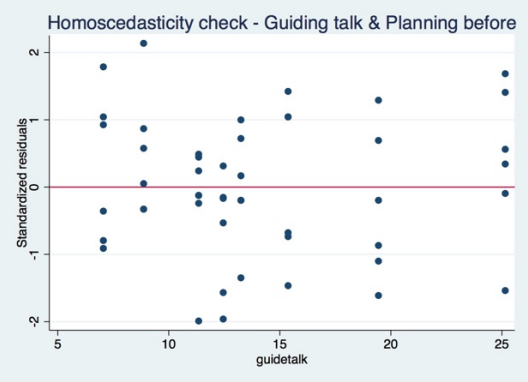
5.5.1 Homoscedasticity checks

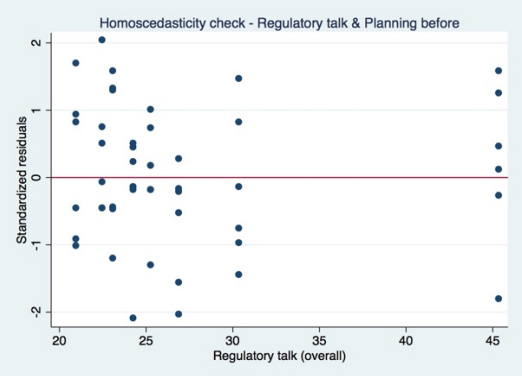
The assumption of homoscedasticity was checked for those models in which teacher talk was found to have a statistically significant predictive relationship with children's self-regulatory behaviours. The results showed that some models, especially those predicting maintaining motivation did not meet the assumption.

5.5.1.1 Predictions of planning before

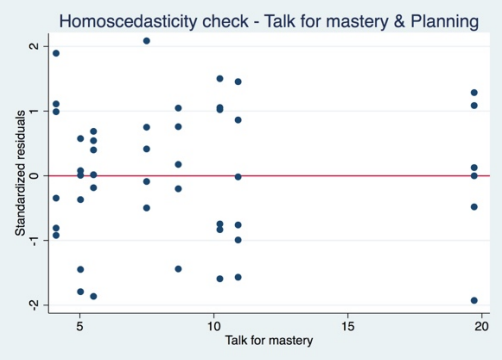
Regulatory talk

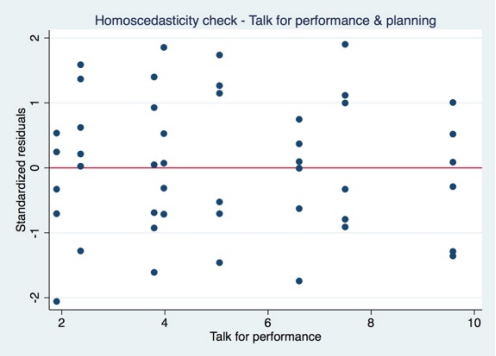


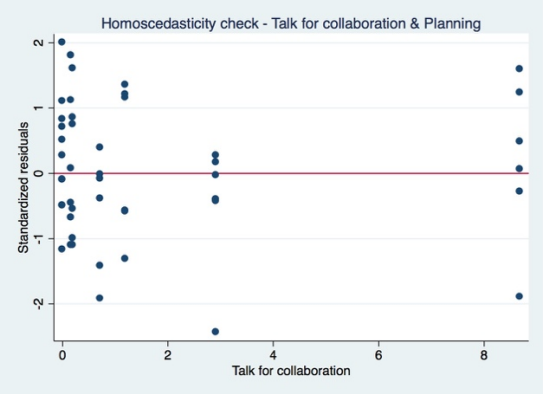


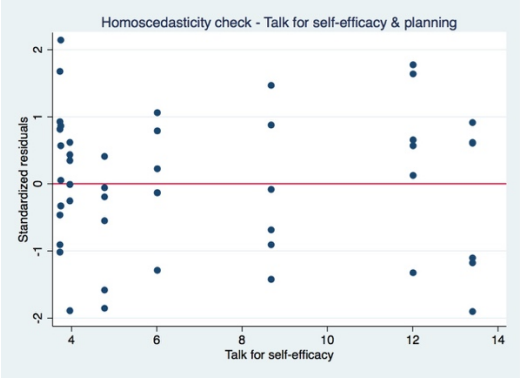


Socio-motivational talk



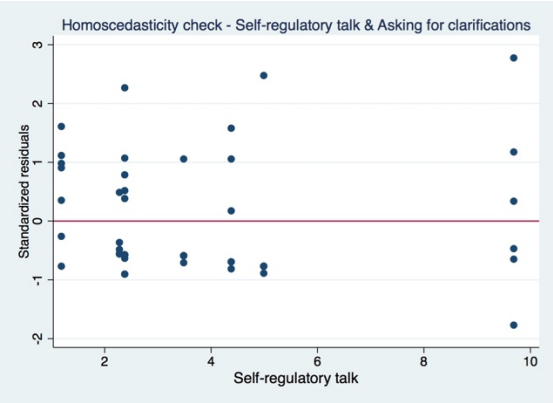


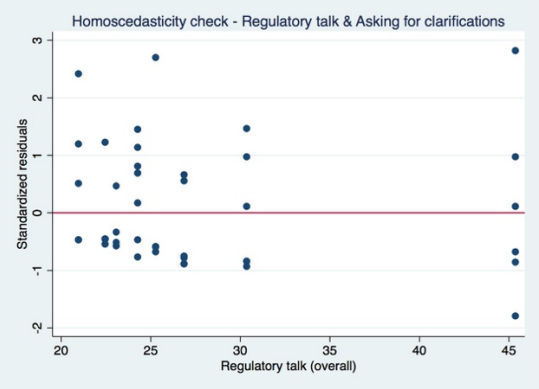




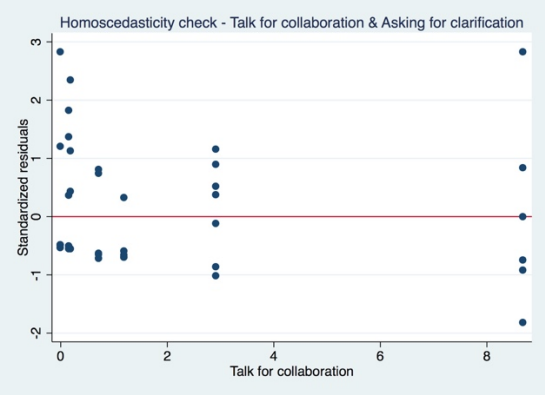
5.5.1.2 Predictions of asking for clarification

Regulatory talk



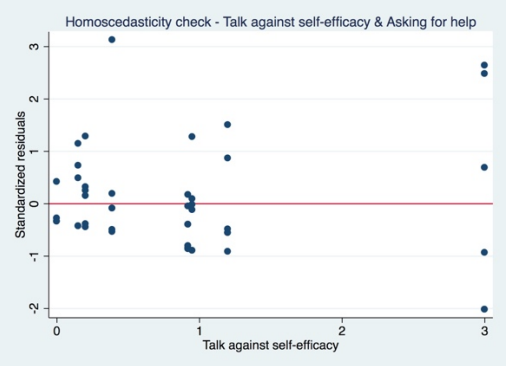


Socio-motivational talk



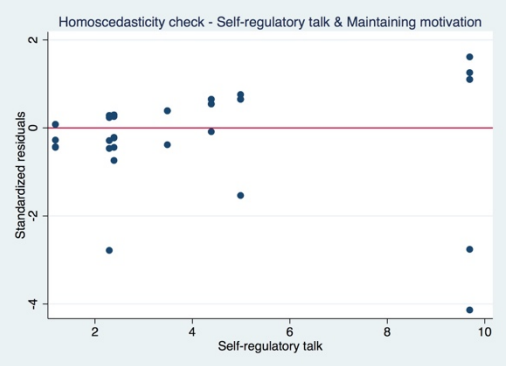
5.5.1.4 Predictions of asking for help

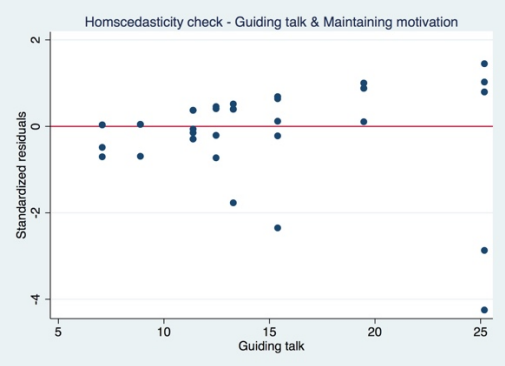
Socio-motivational talk

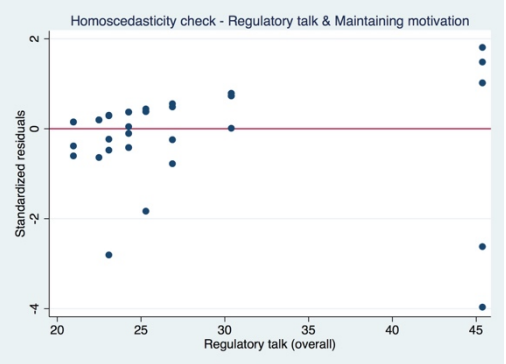


5.5.1.5 Predictions of maintaining motivation

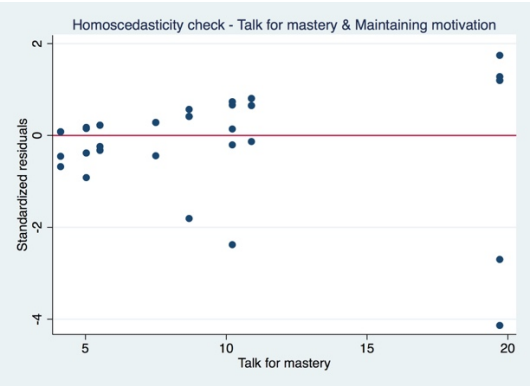
Regulatory talk

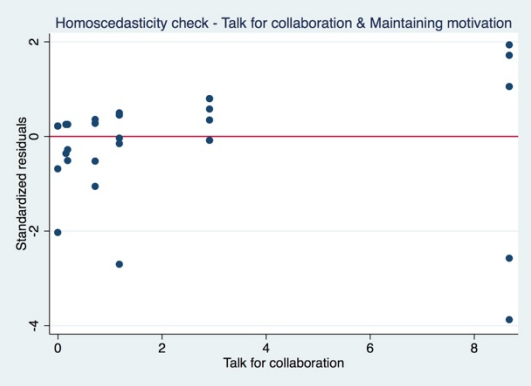


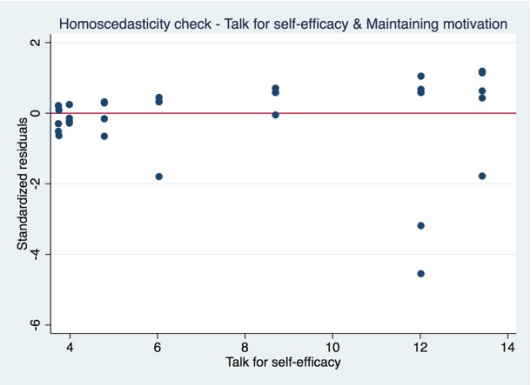




Socio-motivational talk





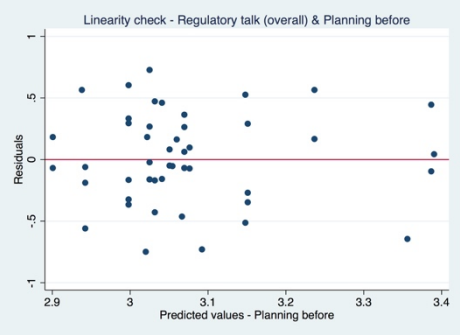


5.5.2 Linearity checks

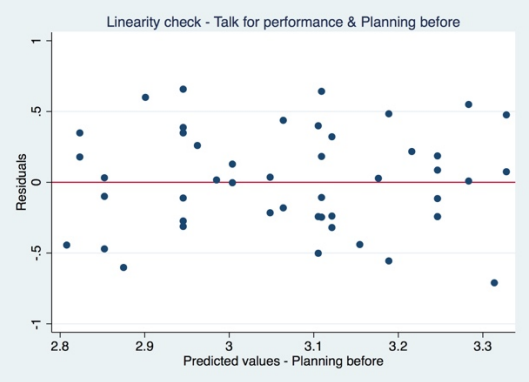
Linearity checks showed that teacher talk had a linear relationship with planning before, but mot with asking for clarifications, asking for help, or maintaining motivation.

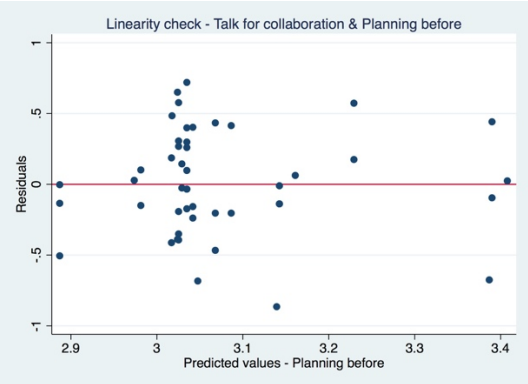
5.5.2.1 Predictions of planning before

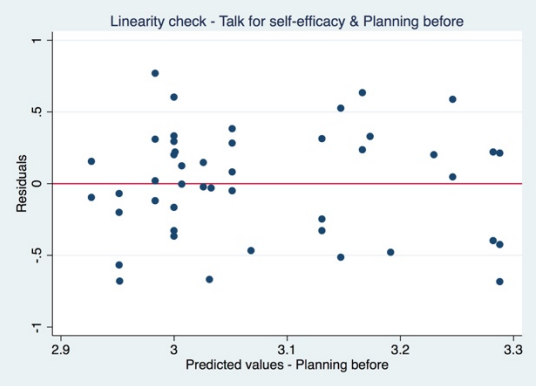
Regulatory talk



Socio-motivational talk

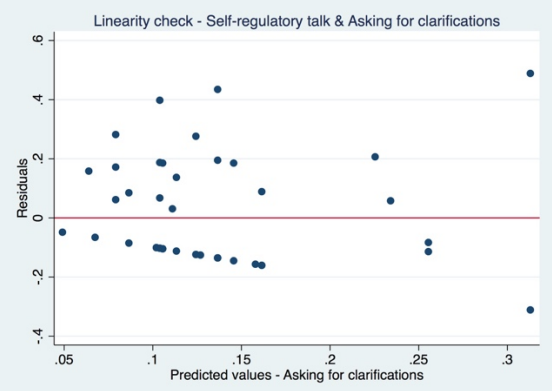


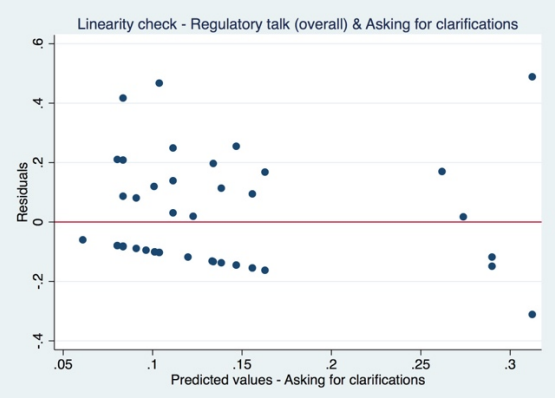




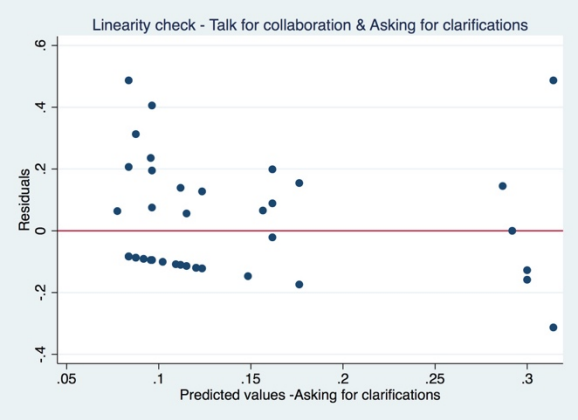
5.5.2.2 Predictions of asking for clarifications

Regulatory talk



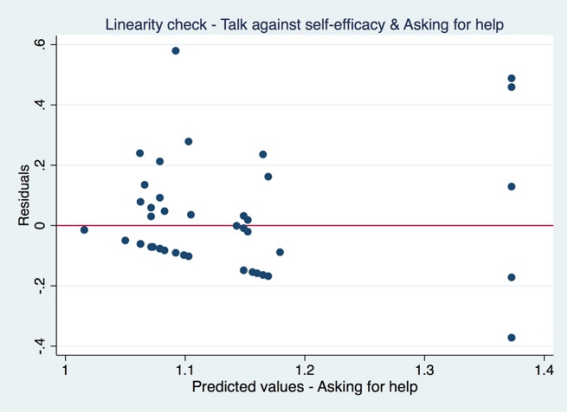


Socio-motivational talk



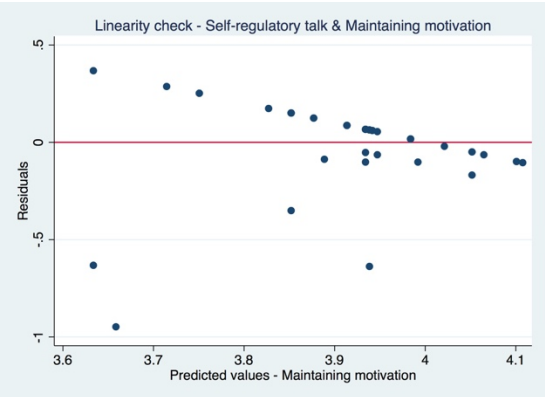
5.5.2.3 Predictions of asking for help

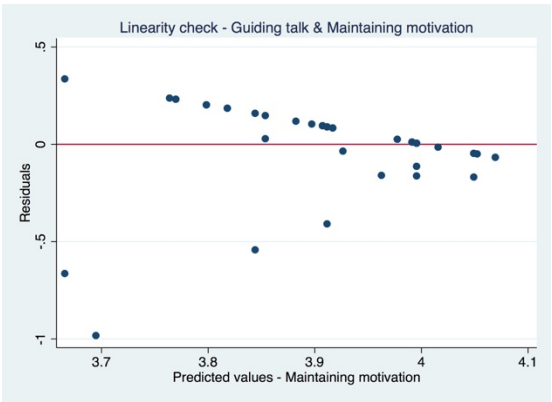
Socio-motivational talk

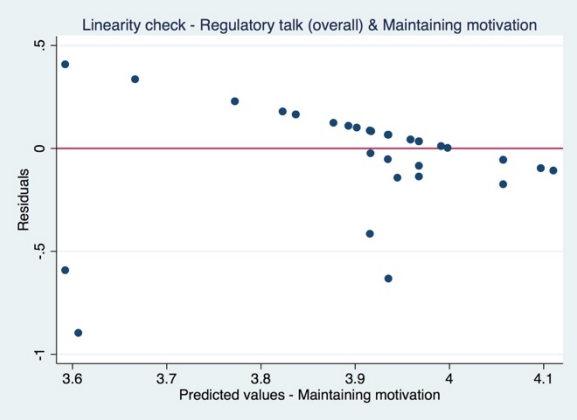


5.5.2.4 Predictions of maintaining motivation

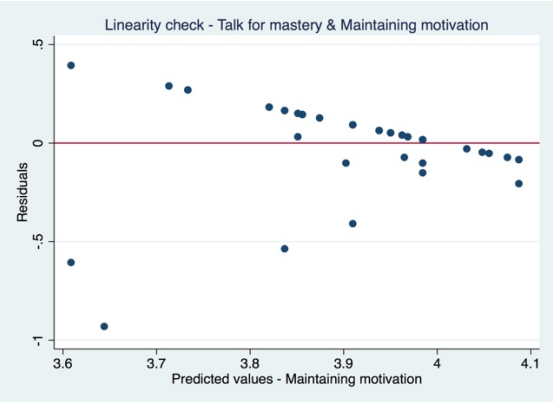
Regulatory talk

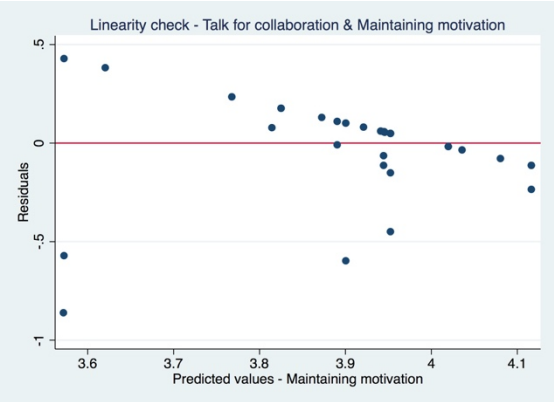


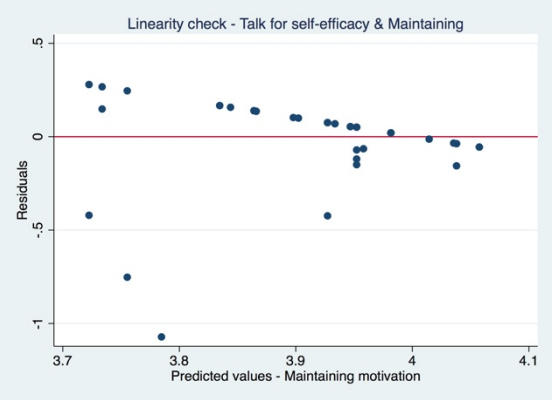




Socio-motivational talk







6 APPENDIX 6 - FURTHER STATISTICAL ANALYSES

6.1 Confirmatory factor analyses

These analyses were conducted to confirm if the results obtained through EFA, specifically the nature of the main factor extracted within each country sample, was the most appropriate or not. In particular, the CFA checked weather effective control of problems, learning from errors, planning during (order), and awareness of errors could have been part of the same factor in each country sample (a 4 variable solution). The results suggest that only three of these behaviours loaded as part of the same factor in either country sample (3 variable solution). This was evidenced by RMSEA levels and their range (see bottom of each reported table). Hence, the results confirm that the solutions extracted through EFA are the most appropriate solution for each country sample.

English sample

Confirmatory factor analysis. 'Productive self-regulation', 3 variable solution. English sample.

Factor 1: Productive self-regulation	Coef	Std. Err.	z	p>z	95% Conf. Interval	
Learning from errors	1 (constrained)					
intercept	2.20038	0.0660	33.37	0.000	2.0744	2.3332
Effective control of problems	1.2761	0.1788	7.13	0.000	0.92556	1.6267
intercept	3.4012	0.0779	43.64	0.000	3.2485	3.5540
Planning during	1.2480	0.1862	6.70	0.000	0.8828	1.6131
intercept	3.1656	0.0730	43.31	0.000	3.0223	3.3088
var (e. Learning from errors)	0.3543	0.0555			0.2606	0.4817
var (e. Effective control)	0.4158	0.0838			0.2801	0.6172
var (e. Planning during)	0.3245	0.0787			0.2016	0.5222
var (e. Factor 1)	0.3302	0.0663			0.2227	0.4894
Model goodness of fit						
Model v.s. Saturated	chi2(0): 0.000; p= .					
RMSEA (upper; lower bound)	0.000 (0.000; 0.000)					
Size of residuals - Coefficient of determination	0.792					

Confirmatory factor analysis. 'Productive self-regulation', 4 variable solution. English sample.

Factor 1: Productive self-regulation	Coef	Std. Err.	z	p>z	95% Conf. Interval	
Awareness of errors	1 (constrained)					
intercept	3.274	0.769	42.59	0.000	3.123	3.425
Learning from errors	1.142	0.229	4.98	0.000	0.693	1.591
intercept	2.193	0.066	33.36	0.000	2.064	2.322
Effective control of problems	1.586	0.286	5.55	0.000	1.026	2.146
intercept	3.390	0.079	43.06	0.000	3.236	3.545
Planning during	1.437	0.282	5.09	0.000	0.884	1.990
intercept	3.153	0.074	42.74	0.000	3.009	3.298
var (e. Awareness of errors)	0.655	0.911			0.499	0.860
var (e. Learning from errors)	0.358	0.052			0.268	0.477
var (e. Effective control)	0.362	0.076			0.240	0.547
var (e. Planning during)	0.346	0.065			0.239	0.500
var (e. Factor 1)	0.243	0.085			0.123	0.483

Model goodness of fit

Model v.s. Saturated	chi2(2): 1.455; p= 0.483
RMSEA (upper; lower bound)	0.000 (0.000; 0.145)
Size of residuals - Coefficient of determination	0.815

Confirmatory factor analysis. 'Productive self-regulation', 3 variable solution. Chilean sample.

Factor 1: Productive self-regulation	Coef	Std. Err.	z	p>z	95% Conf. Interval	
Learning from errors	1 (constrained)					
intercept	2.275	0.631	36.01	0.000	2.151	2.399
Effective control of problems	1.176	0.245	4.80	0.000	0.696	1.656
intercept	3.173	0.757	41.90	0.000	3.025	3.322
Planning during	0.795	0.172	4.60	0.000	0.456	1.134
intercept	3.173	0.069	44.18	0.000	2.929	3.201
var (e. Learning from errors)	0.320	0.080			0.196	0.524
var (e. Effective control)	0.478	0.116			0.296	0.772
var (e. Planning during)	0.585	0.067			0.467	0.732
var (e. Factor 1)	0.346	0.083			0.215	0.555

Model goodness of fit

Model v.s. Saturated	chi2(0): 0.000; p= .
RMSEA (upper; lower bound)	0.000 (0.000; 0.000)
Size of residuals - Coefficient of determination	0.711

Confirmatory factor analysis. 'Productive self-regulation', 4 variable solution. Chilean sample.

Factor 1: Productive self-regulation	Coef	Std. Err.	z	p>z	95% Conf. Interval	
Awareness of errors	1 (constrained)					
intercept	3.133	0.075	41.45	0.000	2.985	3.281
Learning from errors	0.908	0.138	6.55	0.000	0.636	1.180
intercept	2.283	0.063	36.17	0.000	2.159	2.407
Effective control of problems	0.995	0.161	6.17	0.000	0.679	1.311
intercept	3.169	0.075	41.92	0.000	3.021	3.318
Planning during	0.626	0.148	4.23	0.000	0.336	0.916
intercept	3.076	0.070	43.72	0.000	2.938	3.214
var (e. Awareness of errors)	0.483	0.098			0.324	0.720
var (e. Learning from errors)	0.284	0.054			0.195	0.414
var (e. Effective control)	0.498	0.078			0.366	0.677
var (e. Planning during)	0.593	0.607			0.485	0.724
var (e. Factor 1)	0.452	0.107			0.283	0.720
Model goodness of fit						
Model v.s. Saturated	chi2(2): 2.859; p= 0.239					
RMSEA (upper; lower bound)	0.051 (0.000; 0.171)					
Size of residuals - Coefficient of determination	0.775					

6.2 Multilevel regressions applying robust standard errors

All those multilevel models considered to violate the assumption of homoscedasticity were run again using robust standard errors in order to ensure the consistency of the estimations. The explorations showed that almost all models maintained the same results previously found for the effects of teacher talk on students' self-regulation. The only prediction that showed different results from the original findings was that between *talk for self-efficacy* and *maintaining motivation,* which showed not to be statistically significant when applying robust errors.

List of variable names

selftalk : self-regulatory talk (percentage)

guidetalk: guiding talk (percentage)

regtalk: overall regulatory talk (percentage)

progresstalkptg: talk for mastery (percentage)

confidencetalkptg: talk for self-efficacy (percentage)

collaborationtlkptg: talk for collaboration (percentage)

parentsed: parental education (yrs)

parentsed2: parental education (quadratic yrs)

Self-regulatory talk and Asking for clarifications

```
Mixed-effects regression                        Number of obs     =         49
Group variable: schoolid                        Number of groups  =          8

                                                Obs per group:
                                                              min =          6
                                                              avg =        6.1
                                                              max =          7

                                                Wald chi2(3)      =      51.59
Log pseudolikelihood =  15.543586               Prob > chi2       =     0.0000

                                (Std. Err. adjusted for 8 clusters in schoolid)
```

askclarif	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
parentsed	-.0088004	.0457259	-0.19	0.847	-.0984215	.0808206
parentsed2	.0005489	.001453	0.38	0.706	-.002299	.0033968
selftalk	.0207348	.0077686	2.67	0.008	.0055087	.035961
_cons	.0548512	.3225992	0.17	0.865	-.5774316	.6871341

Random-effects Parameters	Estimate	Robust Std. Err.	[95% Conf.	Interval]
schoolid: Identity				
var(_cons)	5.59e-19	7.88e-17	6.8e-139	4.6e+101
var(Residual)	.0310453	.0066499	.0204017	.0472415

Self-regulatory talk and Maintaining motivation

```
Mixed-effects regression                        Number of obs     =         49
Group variable: schoolid                        Number of groups  =          8

                                                Obs per group:
                                                              min =          6
                                                              avg =        6.1
                                                              max =          7

                                                Wald chi2(3)      =      38.03
Log pseudolikelihood =  2.7547086               Prob > chi2       =     0.0000

                                 (Std. Err. adjusted for 8 clusters in schoolid)
```

maintmotiv	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
parentsed	-.1234707	.0856216	-1.44	0.149	-.2912859	.0443445
parentsed2	.0039711	.0029806	1.33	0.183	-.0018709	.0098131
selftalk	-.0411879	.0111732	-3.69	0.000	-.0630869	-.0192889
_cons	4.992462	.6174257	8.09	0.000	3.782329	6.202594

Random-effects Parameters	Estimate	Robust Std. Err.	[95% Conf.	Interval]
schoolid: Identity				
var(_cons)	2.62e-24	4.62e-22	1.6e-174	4.2e+126
var(Residual)	.0523233	.0321042	.0157188	.1741688

Guiding talk and Maintaining motivation

```
Mixed-effects regression                        Number of obs     =         49
Group variable: schoolid                        Number of groups  =          8

                                                Obs per group:
                                                              min =          6
                                                              avg =        6.1
                                                              max =          7

                                                Wald chi2(3)      =      42.05
Log pseudolikelihood =  2.2272481               Prob > chi2       =     0.0000

                                 (Std. Err. adjusted for 8 clusters in schoolid)
```

maintmotiv	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
parentsed	-.1551107	.0991818	-1.56	0.118	-.3495034	.039282
parentsed2	.0050157	.0033817	1.48	0.138	-.0016123	.0116436
guidetalk	-.0182122	.0089441	-2.04	0.042	-.0357423	-.0006822
_cons	5.322755	.7873938	6.76	0.000	3.779492	6.866019

Random-effects Parameters	Estimate	Robust Std. Err.	[95% Conf.	Interval]
schoolid: Identity				
var(_cons)	2.00e-27	5.00e-25	2.8e-240	1.4e+186
var(Residual)	.0534619	.031842	.0166367	.1717993

Regulatory talk and Maintaining motivation

Mixed-effects regression — Number of obs = 49
Group variable: **schoolid** — Number of groups = 8

Obs per group:
min = 6
avg = 6.1
max = 7

Wald chi2(3) = 47.23
Log pseudolikelihood = **3.4064558** — Prob > chi2 = 0.0000

(Std. Err. adjusted for 8 clusters in schoolid)

maintmotiv	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
parentsed	-.151998	.0936938	-1.62	0.105	-.3356345	.0316385
parentsed2	.0050802	.0032556	1.56	0.119	-.0013006	.011461
regtalk	-.0153797	.0041354	-3.72	0.000	-.023485	-.0072744
_cons	5.422478	.7381735	7.35	0.000	3.975684	6.869272

Random-effects Parameters	Estimate	Robust Std. Err.	[95% Conf.	Interval]
schoolid: Identity				
var(_cons)	2.35e-24	4.23e-22	5.5e-178	1.0e+130
var(Residual)	.0509497	.0298358	.016169	.1605459

Talk for mastery and Maintaining motivation

Mixed-effects regression — Number of obs = 49
Group variable: **schoolid** — Number of groups = 8

Obs per group:
min = 6
avg = 6.1
max = 7

Wald chi2(3) = 139.05
Log pseudolikelihood = **3.5219236** — Prob > chi2 = 0.0000

(Std. Err. adjusted for 8 clusters in schoolid)

maintmotiv	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
parentsed	-.1450272	.0914405	-1.59	0.113	-.3242473	.0341929
parentsed2	.0045948	.0031787	1.45	0.148	-.0016353	.0108249
progresstalkptg	-.0240957	.0049908	-4.83	0.000	-.0338775	-.0143138
_cons	5.228324	.6622031	7.90	0.000	3.930429	6.526218

Random-effects Parameters	Estimate	Robust Std. Err.	[95% Conf.	Interval]
schoolid: Identity				
var(_cons)	2.78e-24	5.23e-22	1.9e-184	4.1e+136
var(Residual)	.0507102	.0315309	.014991	.1715379

Talk for collaboration and Maintaining motivation

```
Mixed-effects regression                        Number of obs     =         49
Group variable: schoolid                        Number of groups  =          8

                                                Obs per group:
                                                              min =          6
                                                              avg =        6.1
                                                              max =          7

                                                Wald chi2(3)      =     140.90
Log pseudolikelihood =  4.2497128               Prob > chi2       =     0.0000

                                  (Std. Err. adjusted for 8 clusters in schoolid)
```

maintmotiv	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
parentsed	-.1407152	.0933074	-1.51	0.132	-.3235943	.0421638
parentsed2	.0048582	.0032656	1.49	0.137	-.0015423	.0112587
collaborationtalkptg	-.0438123	.008952	-4.89	0.000	-.061358	-.0262667
_cons	4.960979	.6455248	7.69	0.000	3.695773	6.226184

Random-effects Parameters	Estimate	Robust Std. Err.	[95% Conf.	Interval]
schoolid: Identity				
var(_cons)	1.17e-24	1.09e-23	1.44e-32	9.52e-17
var(Residual)	.0492259	.0291714	.0154089	.1572596

Talk for self-efficacy and Maintaining motivation

```
Mixed-effects regression                        Number of obs     =         49
Group variable: schoolid                        Number of groups  =          8

                                                Obs per group:
                                                              min =          6
                                                              avg =        6.1
                                                              max =          7

                                                Wald chi2(3)      =      24.84
Log pseudolikelihood =  1.2916554               Prob > chi2       =     0.0000

                                  (Std. Err. adjusted for 8 clusters in schoolid)
```

maintmotiv	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
parentsed	-.1253298	.0782192	-1.60	0.109	-.2786367	.0279771
parentsed2	.0039851	.0026605	1.50	0.134	-.0012294	.0091996
confidencetalkptg	-.0238004	.0125358	-1.90	0.058	-.0483701	.0007694
_cons	5.027202	.5965828	8.43	0.000	3.857922	6.196483

Random-effects Parameters	Estimate	Robust Std. Err.	[95% Conf.	Interval]
schoolid: Identity				
var(_cons)	1.79e-22	2.38e-20	1.5e-135	2.19e+91
var(Residual)	.055543	.036324	.0154156	.2001233

6.3 Further analysis of goal oriented motives

This section presents a more grain analysis of the specific types of ideas expressed by children in their interview about achievement motivational attitudes. Only those attitudes that seemed to require further scrutinizing given apparent inconsistencies within the results are reported. These include analyses of effortful learning avoidance driven by feeling unable as well as performance approach driven by performing high(er), feeling able, or relating to others in England. It also includes the analysis of of performance approach driven by performing high(er) or feeling able in Chile.

6.3.1 Analyses of effortful learning avoidance goal oriented motives (English sample)

Effortful learning avoidance driven by avoiding feeling unable

Detail of effortful learning avoidance driven by avoiding feeling unable (England)

School	Student	Topic of question (effort / performance)	Code(s)	Type of situation or behaviour referred to by child
EN1	Student E23	E	C5a	Error
EN1	Student E21	E	C5a	Error
EN3	Student E2	E	A1c + C5b	Challenge
EN3	Student E7	E	C5a	Error
EN2	Student E9	E	C5b	Challenge
EN2	Student E9	E	C5a	Error
EN3	Student E4	E	C5b	Challenge
EN2	Student E13	E	C5a	Error
EN2	Student E10	E	C5b	Error
EN2	Student E10	E	C5a	Error

Summary

Code	Explanation	Frequency
C5a =	Protecting self from embarrassment from failures of performance	6
C5b =	Protecting self from lowering self-concept	4
Error =	Child response given in relation to situations in which friendly others would point out the child errors	7
Challenge =	Child response given in relation to situations in which a challenge is being faced	3

6.3.3 Analyses of performance approach goal oriented motives (English sample)

Performance approach driven by performing high(er)

Detail of performance approach driven by performing high(er) (England)

School	Student	Topic (effort / performance)	Code(s)	Type of situation or behaviour referred by child
EN4	Student E15	P	B3b + D3	Comparison
EN4	Student E14	P	B3b + D3	Comparison
EN1	Student E21	P	B3b	Display
EN1	Student E21	P	B3 + B7a	Comparison
EN1	Student E21	P	B3f	Comparison
EN1	Student E20	P	B3e + D3g	Comparison
EN1	Student E20	P	B3d	Comparison
EN2	Student E11	P	B3e + D5b	Display
EN2	Student E11	P	B3b	Display
EN3	Student E2	P	B3d	Display
EN3	Student E2	P	D5b + B3e + D1a	Comparison
EN3	Student E6	P	B3b + B6a	Competition
EN3	Student E1	P	B3b	Competition
EN4	Student E18	P	B3f	Competition
EN4	Student E17	P	B3c	Competition
EN2	Student E13	P	B3d	Display
EN2	Student E13	P	B3bf	Competition
EN2	Student E13	P	B3b	Comparison
EN2	Student E13	P	B3b	Competition
EN2	Student E13	P	B3e	Competition
EN2	Student E10	P	B7a (B3)	Comparison

Summary

Code	Explanation	Frequency
B3b =	Proving to be better than others	10
B3c =	Proving not to be worse than others	1
B3d =	Meeting social expectations	3
B3e =	Showing good/accurate performance	3
B3f =	Pursuing rewards/recognition	3
B3 (general) =	(not differentiated)	2
Comparison =	Child response given in relation to situations in which children said to compare their performance to those of others	9
Competition =	Child response given in relation to situations in which children said to compete with others	7
Display =	Child response given in relation to situations in which children said to show their performance to others	5

Performance approach driven by feeling able

Detail of performance approach driven by feeling able (England)

School	Student	Topic (effort / performance)	Code(s)	Type of situation or behaviour referred by child
EN4	Student E14	P	B4	Display
EN3	Student E7	P	B4a + D5b	Competition
EN3	Student E1	P	B4a + D5b	Competition
EN1	Student E22	P	B4b	Competition
EN4	Student E16	P	B4	Competition
EN2	Student E13	P	B4b, D5b	Display
EN2	Student E10	P	B4b	Display
EN2	Student E10	P	B4b	Competition

Summary

Code	**Explanation**	**Frequency**
B4a =	Demonstrating to him/herself that he/she is able to competent	2
B4b =	Feel good him/herself in relation to her abilities	4
B4 (general)=	(non differentiated)	2
Comparison =	Child response given in relation to situations in which children said to compare their performance to those of others	0
Competition =	Child response given in relation to situations in which children said to compete with others	5
Display =	Child response given in relation to situations in which children said to show their performance to others	3

Performance approach driven by relating to others

Detail of performance approach driven by relating to others (England)

School	Student	Topic (effort / performance)	Code(s)	Type of situation or behaviour referred by child
EN1	Student E23	P	B6	Display
EN1	Student E23	P	B6	Comparison
EN1	Student E23	P	B6a + D5a	Display
EN1	Student E24	P	B6a	Display
EN2	Student E12	P	B6a	Comparison
EN2	Student E11	P	B2a + B6a	Display
EN2	Student E11	P	B6c	Competition
EN2	Student E11	P	B6c	Comparison
EN3	Student E7	P	D5a + B6a	Display
EN3	Student E7	P	B6a	Competition
EN3	Student E7	P	B6a	Comparison
EN3	Student E1	P	B6a	Display
EN3	Student E1	P	B6a	Display
EN3	Student E1	P	B6a	Competition
EN3	Student E6	P	B3b + B6a	Competition
EN3	Student E6	P	B6a	Competition
EN1	Student E22	P	B6a	Display
EN1	Student E25	P	B6a + D6c	Comparison
EN2	Student E8	P	B6a	Display
EN2	Student E9	P	B6a	Display
EN2	Student E9	P	B6a	Comparison
EN2	Student E8	P	B6a	Competition
EN2	Student E9	P	B6a	Comparison
EN4	Student E19	P	B6a	Comparison
EN4	Student E19	P	B6a	Competition
EN4	Student E16	P	B6	Display
EN4	Student E16	P	B6	Display
EN3	Student E3	P	B6b	Comparison
EN2	Student E10	P	B6a + D7a	Comparison

Summary

Code	Explanation	Frequency
B6a =	Sharing with others (taking part, having fun, belonging to groups)	22
B6b =	Protecting relationship from conflict	1
B6c =	Protecting others from embarrassment	2
B6 (general)=	(non differentiated)	4
Comparison =	Child response given in relation to situations in which children said to compare their performance to those of others	10
Competition =	Child response given in relation to situations in which children said to compete with others	7
Display =	Child response given in relation to situations in which children said to show their performance to others	12

6.3.5 Analyses of performance approach goal oriented motives (Chilean sample)

Performance approach driven by performing high(er)

Detail of performance approach driven by performing high(er) (Chile)

School	Student	Topic (effort / performance)	Code(s)	Type of situation or behaviour referred by child
CH1	Student Ch4	P	B1ce + B3b	Comparison
CH1	Student Ch3	P	B3bf	Comparison
CH4	Student Ch16	P	B3f	Display
CH4	Student Ch16	P	B3b	Competition
CH2	Student Ch22	P	D7b + B3a	Display
CH2	Student Ch24	P	B3f + D4a	Display
CH2	Student Ch24	P	B3f + D6c	Comparison
CH1	Student Ch2	P	B3a + D7b	Display
CH1	Student Ch2	P	B3a	Display
CH1	Student Ch2	P	B4b + B3a + D5a	Competition
CH1	Student Ch2	P	B3e	Display
CH1	Student Ch5	P	B3a + D5a	Display
CH4	Student Ch15	P	D5a + B3e	Display
CH4	Student Ch15	P	B3e	Display
CH4	Student Ch15	P	B3b	Competition
CH4	Student Ch13	P	B3e	Competition
CH4	Student Ch15	P	B3f + D6b	Competition
CH2	Student Ch20	P	B3f	Display
CH2	Student Ch21	P	B3f + B4b	Display
CH2	Student Ch20	P	B3f	Competition
CH1	Student Ch1	P	B3b	Competition
CH4	Student Ch17	P	B3f + A1e	Display
CH3	Student Ch12	P	B3f	Display
CH3	Student Ch8	P	B4b + B3a	Display

Summary

Code	Explanation	Frequency
B3a =	Demonstrate high competence levels to others	6
B3b =	Proving to be better than others	5
B3e =	Showing good/accurate performance	4
B3f =	Pursuing rewards/recognition	10
Comparison =	Child response given in relation to situations in which children said to compare their performance to those of others	3
Competition =	Child response given in relation to situations in which children said to compete with others	7
Display =	Child response given in relation to situations in which children said to show their performance to others	14

Performance approach driven by feeling able

Detail of performance approach driven by feeling able (Chile)

School	Student	Topic (effort / performance)	Code(s)	Type of situation or behaviour referred by child
CH1	Student Ch2	P	B4b + B3a + D5a	Competition
CH4	Student Ch15	P	B4b	Display
CH2	Student Ch21	P	B3f + B4b	Display
CH1	Student Ch1	P	B4b + D5a	Display
CH3	Student Ch8	P	B4b + B3a	Display

Summary

Code	**Explanation**	**Frequency**
B4b =	Feel good him/herself in relation to her abilities	5
Comparison =	Child response given in relation to situations in which children said to compare their performance to those of others	0
Competition =	Child response given in relation to situations in which children said to compete with others	1
Display =	Child response given in relation to situations in which children said to show their performance to others	4

6.3.6 Correlation matrix – Goal oriented motives (England)

Correlation matrix - Goal oriented motives. England.

Goal oriented motive	Effortful learning approach - learning	Effortful learning approach - performing high(er)	Performance approach - learning	Performance approach - helping others to learn	Performance approach - performing high(er)	Performance approach - feeling able	Performance approach - relate	Effortful learning avoidance - not feeling unable	Performance avoidance - learning	Performance avoidance - performing high	Performance avoidance - not feeling unable	Performance avoidance - relate
Effortful learning approach - learning	1.00											
Effortful learning approach - performing high(er)	-0.16	1.00										
Performance approach -learning	-0.15	0.17	1.00									
Performance approach -helping others to learn	0.27	0.05	-0.19	1.00								
Performance approach -performing high(er)	**-0.43****	0.16	-0.04	-0.02	1.00							
Performance approach -feeling able	0.24	-0.05	-0.28	-0.17	-0.06	1.00						
Performance approach -relate	0.33	**-0.40****	0.02	0.15	**-0.49****	0.11	1.00					
Effortful learning avoidance - not feeling unable	**-0.41****	0.12	-0.34	-0.22	-0.01	0.19	-0.00	1.00				
Performance avoidance - learning	-0.26	-0.09	-0.16	-0.12	0.28	-0.13	-0.25	0.25	1.00			
Performance avoidance - performing high(er)	0.13	0.16	0.15	-0.27	0.09	-0.16	-0.27	-0.18	-0.16	1.00		
Performance avoidance - not feeling unable	-0.07	-0.19	-0.30	-0.05	0.02	**0.46****	**0.45****	**0.36(*)**	-0.02	**-0.46****	1.00	
Performance avoidance - relate	0.26	0.03	0.01	-0.26	-0.26	0.12	-0.19	-0.02	-0.21	0.06	-0.16	1.00

***Statistically significant relationship at p<0.05

(*)Tendency towards significant relationship p<0.10

6.3.8 Correlation matrix – Goal oriented motives (Chile)

Correlation matrix - Goal oriented motives. Chile.

Goal oriented motive	Effortful learning approach - learning	Effortful learning approach - performing high(er)	Performance approach - learning	Performance approach - helping others to learn	Performance approach - performing high(er)	Performance approach - feeling able	Performance approach - relate	Effortful learning avoidance - not feeling unable	Performance avoidance - learning	Performance avoidance - performing high	Performance avoidance - not feeling unable	Performance avoidance - relate
Effortful learning approach - learning	1.00											
Effortful learning approach - performing high(er)	-0.24	1.00										
Performance approach -learning	**0.45****	-0.09	1.00									
Performance approach -helping others to learn	0.12	-0.15	0.27	1.00								
Performance approach -performing high(er)	-0.01	0.14	0.05	-0.11	1.00							
Performance approach -feeling able	-0.28	0.31	-0.21	-0.12	**0.44****	1.00						
Performance approach -relate	-0.13	0.15	-0.08	0.18	**-0.57****	-0.32	1.00					
Effortful learning avoidance - not feeling unable	-0.07	0.20	0.13	-0.20	**0.51****	0.07	**-0.35(*)**	1.00				
Performance avoidance - learning	0.22	-0.10	**0.35(*)**	0.24	0.21	-0.15	-0.14	**0.46****	1.00			
Performance avoidance - performing high(er)	0.19	-0.08	0.28	-0.12	0.15	-0.01	**-0.49****	0.29	0.26	1.00		
Performance avoidance - not feeling unable	-0.20	-0.01	-0.21	0.01	0.18	0.31	-0.17	0.18	-0.08	0.23	1.00	
Performance avoidance - relate	-0.11	0.22	-0.32	-0.20	0.12	0.08	0.08	-0.20	**-0.37(*)**	0.27	0.28	1.00

***Statistically significant relationship at p<0.05

(*)Tendency towards significant relationship p<0.10

7 APPENDIX 7. PILOT STUDY

I conducted a pilot study in order to test how appropriate the research design and tools for the purposes of the study, the research time frame, and the technical aspects of the data collection were. The pilot study included spending two weeks between two Year 4 classrooms in an English primary school. During these two weeks I assisted, observed and recorded several literacy and numeracy lessons, as well as interviewing teachers after each recorded lesson and testing the individual task I had chosen for measuring students' self-regulation. The idea was to conduct the pilot as if it were the final data collection phase. In addition to this, I requested some classroom videos from the Chilean Ministry of Education in order to simulate the comparative process the final analytical phase would require. Due to time restrictions and how time consuming the analysis of the obtained data proved to be, only a small portion of the data was finally analysed. Throughout this section I will expand on what was done and analysed and what were the conclusions of each aspect explored in the pilot, both in terms of appropriateness and feasibility for the final data collection and analytical phase. Please note that the pilot includes aspects that could no be included to the final PhD thesis due to time constrains. Among the aspects that were piloted and excluded from the final study were the analysis of classroom norms and values as well as classroom activity settings, teacher interviews about their own beliefs as well as their teaching practice, and students' interviews about their epistemic beliefs and intelligence theories.

7.1 School, classroom and lesson sampling

7.1.1 Tested sampling criteria

Following Alexander's (2000) advice about sampling for undertaking comparative studies between cultures, I assumed that representativeness was a misleading classroom selection criterion. This criterion does not acknowledge the real diversity of the classrooms that one could find even within one particular school. Therefore I did not take into account any school characteristic other than choosing a state comprehensive primary school with two Year 4 classrooms. These criteria were included because I am particularly interested in researching for the improvement of free and non-selective school segments, which in Chile tend be attended by the most disadvantaged third of the population. By carrying out my pilot in an English school like this, I could have a general idea of the level to which these sorts of English schools could be compared with similar types of schools that I am familiar with back in my home country.

Furthermore, I selected a school that had two classrooms per level, so I could study two Year 4 classrooms in parallel. This seemed relevant considering the theoretical model at which I had

arrived after my literature review. According to this model, both teachers' personal and contextual factors may have an impact on the interactions and structures taking place in a classroom. By having access to two Year 4 classrooms in the same schools, I could explore the relevance of the culture of the school community for the classroom level culture afforded by the teacher, and decide whether or not to follow the same design for the final study.

I also piloted the criteria for lesson sampling. I wanted to decide whether or not to include both literacy and numeracy lessons in my research as opposed to only one of them. I also wished to know if it was better for my analysis to have a series of continuous or non-continuous lessons. So, within each of the English classrooms I looked at teaching-learning processes in numeracy and literacy, and I analysed the last lesson of a series of three observed-recorded lessons in one of the English classrooms as well as a one-off lesson in a Chilean classroom.

Finally, I piloted a student sampling system for the six students I would need to have in every classroom. I asked the teacher to rate the level of SRL of all his/her students as low, medium or high after reading a description of what a self-regulated learner is able to do (Whitebread and Pino-Pasternak, 2013) (see characterization sheet in Appendix 9). On the same sheet I asked the teachers to point out the groups of students who usually worked together in order to cause the least possible intrusion when carrying out the observation. Moreover, I asked the teacher to indicate those who usually communicate fluidly through talk in order to have more chances of listening to their ideas, which is crucial for the study. Considering this information I selected three children regarded as high self-regulators for learning and three regarded as having low and medium levels of self-regulated learning. My initial intention was to select three students with high SRL and three with low SRL in order to make sure I could get enough variability to be able to conclude about these two groups.

7.1.2 Considerations and conclusion about sampling criteria

From what I could see from my observations in the English school and from information offered by one of the teachers during an informal chat, the English school I came across with was a school allocated in a privileged middle-class catchment area. According to the teacher, many of the children attending this school would end up enrolling later in a private secondary school. From my classroom observations as someone not used to primary school environments in England, this fact was not evident. Apart from noticing that students did not wear school uniforms and therefore must have come from families with enough money to afford this, there was no straightforward indicator I could notice regarding the social class background of the school.

Nevertheless, according to official information checked after the pilot study was conducted, only 4.5 per cent of the students in this school are eligible for free school meals, positioning it in the

low band of necessity in comparison with other schools in England. This would probably be a useful indicator to check before approaching English schools for the final data collection. Having a socio-economic point of reference to ensure comparability between the participating schools from Chile and England would probably help control the important effect that students' cultural capital might have on what they bring to classroom interactions. Even though – given the different socio-economic situations of the two participating countries – the level of vulnerability of school catchment might not be directly comparable, general socio-economic indicators could help to make sure similar social positions within each culture are being compared.

Regarding the classroom sampling, it was evident to me that some common elements were shared between the two classrooms in the same school. There was a shared ethos of interpersonal respect, high expectations of the children's capacities, an understanding of schooling as a process of training for real life demands, and a high valuing of peer discussion to foster individual comprehension, among other elements. Nevertheless, there were also important differences among the classes. For example, in relation to motivational climate, as will be shown later in this chapter (Section 2.2.2), one classroom structure proved to be much more competition focused and treated knowledge more as a right/wrong sort of entity than the other. Therefore, I decided I will apply classroom sampling that acknowledges this conjunction of difference and similarities with a particular school. I will invite two classrooms from each school to participate in the study.

The relevance of sampling a continuous set of lessons or not in my pilot proved to depend on the type of data analysed. At the whole class level, it proved to be less relevant than at the relational level. Whole class talk could be followed without many problems in the one-off analysed video from Chile. Discourse forms, such as interrogatory, evaluative and expository (see Chapter 2, Section 6.2.1), were easy to identify in this video. Other analytical elements such as the type of teacher questions and instructions as well as the level of thinking of teachers' and students' contributions (e.g. Procedural/Declarative; Object/Meta level) were relatively clear. The problem of using non-continuous data is that it does not allow for the understanding of more subtle intentions enacted in interactions within certain relationships. For example, in the lessons analysed for the English case it would not be possible to understand why the teacher frequently did not give the turn to a particular student who always had her hand up. Through the videos it was possible to see how almost every time the student had the turn she talked about unrelated matters or went blank, so the teacher tried to avoid her participation to a certain extent. It would also not be possible to understand why, when on the same table, one of the students who was closely observed did not interact as much as she used to do in previous sessions. Given the continuous data it was possible to infer that she would interact enthusiastically with a friend but not with someone who was not. Therefore, understanding this level of subtle intentionality

could inform greater comprehension of the functionalities of the talk happening in the lesson. Considering this, continuous sessions will therefore be filmed.

Furthermore, considering the relevance of continuity, the richness of information and demand on my time that each hour of video generated, I will only examine one academic subject instead of two in order to focus the efforts and robustness of the results. The numeracy lessons observed, both in Chile and England, proved to be more driven by the content than the activity, with geometrical figures being the centre of the lesson in the Chilean class and fractions being the centre of the lesson in the English ones. Even though the teachers tried to generate some connections with real life elements and problems in the numeracy lessons (e.g. a Toblerone chocolate to illustrate a prism), it was clear that literacy was the subject where more culturally relevant activities were conducted. For example, in the English lessons the children were working as if they were journalists, learning how to ask other people questions, take notes of the answer and write an article about what they found out. Consequently, and in line with the importance that Rogoff (2003) gives to the study of the participation of children in the activities of their communities for the understanding of their development in society, Literacy will be considered as the centre of this study.

Finally, the sampling technique used for the selection of the six students of each participating classroom demonstrated some interesting results. The procedure proved to be adequate, with the two English teachers being able to clearly identify those students who were more self-regulated than others. This was corroborated through a general observation of behaviours for the overcoming of difficulties when children were carrying out the individual tasks specially designed for SRL measurement. Moreover, even though an effort was made to make sure all target students had some friendly peers in the selected group of students, it was possible to observe that most students would only talk to students of the same sex. So at times when students were grouped with members of the opposite sex much more individual work than peer collaboration was observed. These observations not only generate new criteria for sampling but also for the specific grouping of students during the filming. Students will, therefore, be sampled according to SRL level as observed by teachers, but also making sure that friends of the same sex are included and carefully grouped together during the sessions. In addition, in the case of Chile, it is possible that many of the researched classrooms will not work very frequently in groups, as confirmed by a Chilean council school administration authority. Alternative procedures might need to be developed for these cases.

7.2 Type of information obtained through the gathered data

Different sorts of data were gathered. In the case of the data obtained in England – which shows the intended final research design –I videoed whole classrooms and target student groups in everyday lessons. I also applied an individual task to the children included in the target group

for the measurement of SRL skills. Additionally, short interviews were conducted with the teachers following each lesson recorded. On the other hand, in the case of Chile, videos of lessons specially prepared by Chilean teachers for the assessment of their teaching performance were retrieved from the Teacher Evaluation System, which were lent by the Ministry of Education for the pilot of my project. Having these Chilean videos allowed me to conduct a preliminary comparative analysis to test the appropriateness of these relevant coding categories found in the literature.

In the following sections I will expand on how the three different levels of analysis (communitarian, interpersonal and personal) I wish to include aid understanding of the development of students' self-regulated learning in the classroom of two different countries. As I present the different analytical categories I piloted using the data described above, I will point out the extent to which each type of data seems to inform the analysis of the different dimensions I am considering in each level of analysis. I include examples from lessons from both countries so some conclusions about the appropriateness of the data format for the proposed comparative analysis can be offered.

7.2.1 Community cultural level

The recording of whole classroom videos followed by personal interviews of teachers regarding some pedagogical decisions observed in the classroom and their motivations for making these decisions were generated in order to obtain information about the community and interpersonal levels of the classroom. A list which reflects the different relevant dimensions which the whole classroom videos were expected to demonstrate can be seen in Table :

Table Pre-pilot community cultural themes and elements

Theme	Elements	Adapted from
Social Norms	School and classroom explicit/implicit rules and role expectations of teachers and students	Alexander 2000
Cultural Values	Conservatism/Autonomy; Hierarchy/Egalitarianism; Mastery/Harmony	Schwartz, 2011
Educational Values	Valued abilities, developmental educational goals, and types of social participation	Rogoff, 2003

Most of these dimensions were successfully demonstrated in the obtained data. Classifications of different activities, actions and interactions allowed the inference of data characterizing the community cultural level. I expand on each of them below.

7.2.1.1 Social norms

Social norms were analysed through the observation of classroom activity as well as information given by teachers in their interviews and school observations gathered during the two weeks I spent in the school. Some of the roles and rules observed in the English classroom from what can be seen from an in-depth analysis of five minutes of a lesson complemented with information given by the teacher through interviews and general impressions of my two weeks spent in the classroom are (for more detail see Appendix 8):

Teacher role. Teacher is in charge of managing classroom talk; managing the order, attention and engagement of students; setting and managing learning activities and times; and monitoring and supporting the development of students' understanding.

Student role. Students are in charge of listening, talking, thinking and conducting activities in order to learn from themselves, peers or the teacher. They follow teacher instructions, collaborate with peers, and let the teacher know their needs and ideas if necessary or required.

As in any classroom, the different roles of teachers and students are carried out in specific ways. For example, within the English classroom analysed, the role of supporting and developing students' understanding was delivered by the teacher through:

> Communicating relevant content to the class indirectly through the elicitation of children's contributions
>
> Asking questions of the class or particular children
>
> Helping students find answers to formulated questions by guiding their reasoning using auxiliary questions
>
> Making children reflect about their answers when these were not accurate and repair the answers themselves
>
> Correcting inaccurate student answers directly
>
> Eliciting knowledge from children (from past activities, contents, or personal experiences)
>
> Setting up and manage authentic learning activities, where children felt as though they were rehearsing adult-like roles or engaging in socially relevant problem-solving
>
> Assisting students' current thinking when visiting some groups or particular children when student group activity takes place
>
> Generating feedback to students; tailoring it to the cognitive and motivational resources of the specific student

During the analysis it was possible to realize how these ways of ensuring students' understanding seemed to be based on specific social rules of individual behaviour and interaction. A key classroom rule dimension that may be relevant for different classroom roles are the rules surrounding talk, because talk not only accompanies many types of behaviour but also because is the main symbolic mediator of human interaction. In the case of the English lesson analysed, these rules about talk could be summarized as follows:

When teacher talks to class: teacher should usually talk about learning content or activities. Everybody should be listening to him quietly and sitting down without any source of distraction nearby. Nevertheless, some children may move around freely as long as they do it respectfully and with a work-related purpose. They are allowed to interrupt the teacher, by calling out, to ask questions without needing the teacher to give them the turn to do so, but the regular way to do this is to raise a hand and wait for the teacher to grant the turn.

When teacher and a student talk: other students should not interrupt. Talk can be colloquial but has to be respectful and focused on what is being learned or related matters.

When students talk to teacher: all the class, including the teacher, should be listening to the student. Not respecting the turn of a classmate, interrupting or ignore by engaging in a different activity, is regarded as unacceptable behaviour. The content of the talks should be what is being learned or related matters.

When students are asked to talk to each other: They are allowed to be as noisy as they want, walking around the classroom if needed, but are required to focus on talking with at least one peer from their group table. Discussion should follow the topic instructed by the teacher and stop as soon as the teacher asks for it to stop.

The same role of ensuring understanding can be found for the case of the Chilean lesson analysed. It was possible to observe some similar as well as different means for delivering this role were possible to observe. Some of the means used by the Chilean teacher that differ from those of the English were:

> Ignore students' mistakes but implicitly judge their inaccuracy by seeking the answer of an alternative student until the correct response is offered
>
> Carrying out non-authentic learning activities focused on the content more than the use of the learning material
>
> Taking command of the content of group talk when visiting some groups or particular children when student group activity takes place

Whereas similar ones were:

Communicating relevant content to the class indirectly through the elicitation of children's contributions

Asking questions of the class or particular children

Eliciting knowledge from children (from past activities, content, or personal experiences)

Here it is important to point out, that, from what can be seen from this preliminary analysis, it is not the existence of the generic role of ensuring understanding, managing students engagement, or setting and managing learning activities and times that characterize a cultural context, but the way these roles are delivered. This role delivery through specific ways of doing things when being 'the student' or 'the teacher' is what becomes the 'expected' role of the participants of the classroom community.

7.2.1.2 Cultural values

These values may be seen at the classroom, school, or educational system. They may reflect cultural values of a society or institution. For the moment, given that only one lesson from each country was analysed in depth, I am not in a position to say which of these values correspond to a particular school or schooling system. Nevertheless, at the end of the final analysis of the current research project I expect to be able to determine this according to the similarities and differences found between the classrooms within and between the different schools and schooling systems analysed.

I analysed the general cultural values reflected in each of the classrooms analysed by looking at information from the first five minutes of the Chilean and English lessons, as well as the teacher interviews and school observations for the English case. I categorized this information applying the three dimensions of cultural values proposed by Schwartz (2011); namely Conservatism-Autonomy, Hierarchy-Egalitarianism and Mastery-Harmony.

As was expressed in the past chapters of this report, at the level of a culture the conservatism-autonomy dimension reflects the value for keeping the status quo of affairs as opposed to pursuing the development of people's own independent ideas and positive affective experiences (Schwartz, 2011). Throughout the analysis, it was possible to see how different elements present in the classroom as well as the activities and behaviours observed in the classroom could be categorized as one of the dimensional poles (conservatism *or* autonomy) or as reflecting a tension between the values within the dimension (conservatism *and* autonomy). Some examples of the polarized reflection of such a value dimension were:

Autonomy

England – schooling system: The learning objective of the lesson was to develop skills of note-taking. This may reflect a value of independent ways of doing things because, as stressed by the teacher, note-taking is a personal process that might include personal symbols. This also shows an understanding of thinking about the teaching of writing in the early years which goes beyond standardized and grammatically correct writing.

England – school: The teacher is allowed to plan their lessons independently, without the need to pass the lessons through the approval of any school authority. This seems to reflect openness and trust in the ideas that the teacher has for delivering the curriculum.

Chile – classroom: Students are asked to answer questions almost only when they want to talk and raise their hand to communicate their interest in doing so. This may reflect a respect for the students' willingness to participate in the lesson.

Conservatism

Chile – classroom: Students stay seated in their chairs during the whole lesson, no one moves from their table. This reflects an interest in keeping a controlled pre-defined classroom order.

Chile – classroom: When students reply incorrectly or even just not that close to what the teacher is expecting them to say, the teacher seeks the answer of another student instead of exploring the reasons underlying their ideas. This seems to reflect a sort of interest in keeping teacher's ideas as the desirable ideas, undermining the differing ideas of the students.

England – schooling system: There is a school inspection every 3 to 4 years where classrooms are observed and assessed based on standard criteria. This seems to reflect an interest in keeping a certain level of similarity in the way English teachers teach.

Autonomy and Conservatism (with different degrees of predominance of the one over the other)

England – classroom. There is a great deal of discussion between children and the interactive whiteboard does not take a predominant role. Nevertheless, the teacher seems to guide the ideas of the students directing them to a clear learning objective. This reflects a strong valuing of students' own ideas but with some interest in their thinking towards what is required for the session.

England – classroom: Teacher follows a lesson plan but is able to be flexible about it, adapting the contents of what is talked about during the lesson to the reactions of students. Previously planned activities are still delivered. This might reflect a strong value of the needs of the students, but structured around the interest in carrying out the planned activities.

Chile – classroom: Sometimes students are given opportunities to express their ideas through the use of open questions, but most of the time they have to answer closed questions quickly. This reflects a strong value of sticking to the delivery of content checking surface understanding of students, but with some space for more elaborate independent thinking from the students.

Similar analysis can be carried out about values such as Hierarchy-Egalitarianism (about the value of equality or inequality in distribution of power, roles and resources), and Mastery-Harmony (about the value of controlling or preserving/accepting the natural and social world for the interest of a person or group). Some examples regarding these values can be found in Appendix 6.

7.2.1.3 Educational values

Prior to undertaking of my pilot study, I intended to analyse the abilities, developmental educational goals, and types of social participation valued in each cultural context. Overall, data obtained from the video of whole classroom lessons and the explanation of teaching intentions provided by the teachers in their post-lesson interviews gave rich information about the abilities and participations valued in education. Some aspects about developmental goals could be seen in the interviews of teachers. However, because the focus of the interview was the understanding of professional decisions, developmental goals only appeared occasionally in this data. The analysis made clear that these different values are interrelated. The abilities valued seem generally in line with pursued developmental goals and types of social participation valued highly depend on them.

7.2.1.3.1 Abilities valued

The different teacher demands observed seemed to reflect the abilities that are valued as well regarded within each classroom context. These abilities were usually required as part of a learning activity or represented part of the learning objectives, both explicitly or implicitly. Some examples of abilities valued in the English case were:

Oral skills, such as listening and talking: They were required throughout the whole lesson in order to follow what the teacher and other students were saying as well as to communicate own ideas to the class.

Writing skills, such as question formulations and note taking: Students were asked to generate and write down questions they were going to use when interviewing a special character played by the teacher in a role playing situation. They also had to take notes of the answers provided by this character.

Discussion and collaboration abilities, such as interpersonal skills, critical thinking and oral skills: Students were required to engage in micro-discussions with peers on several

occasions throughout the lesson. In these discussions students were required to discuss things like how to take good notes, which notes should be taken from a given text, and look at a peer's work and tell them what they liked about it.

7.2.1.3.2 Developmental goals

Developmental goals reflect the sort of abilities that it is expected will be developed throughout schooling. These could not be inferred from the video data and could only be established from what the teacher expressed in his interview. For example, when asked about what he thought about developing the skill of note taking as supposed to proper writing the English teacher replied:

> *Yes, it was interesting because, actually, it's a good skill for them. Specially going forward, you know, as they get older they´ll start, they will need to start to take more and more notes, specially, you know, those who go to lectures and finally university...So I think it is really important for them. They might not think so at the moment, you know, because they like writing stories and things like that. And it is strange sort of telling them, you know, you can write M and the number 8 for "mate", you know. But I think it is important for them to get the hang of taking notes, definitely.*

It is interesting to note, as explained before, that the abilities valued, such as the writing ones, do relate to the developmental goal explained here. This is an example of the level of relation between them, which nevertheless, required the input of the teacher in order to be established.

7.2.1.3.3 Types of social participation

The different types of social participation valued, or the level of participation that society values students being prepared for, make use of the abilities valued, and are based on the developmental educational goals valued, as exemplified above. These types of social participation are embedded in the different activities carried out in the classroom. In the case of the English classroom observed, different types of social participation seen in society could be seen being promoted throughout the two weeks of piloting. Among them were:

> Students reading newspapers in order to become familiarized with this particular format of recount.
>
> Students acting as journalists in the role playing designed by the teacher about a particular scenario. Students asked questions and took notes from their interviewee's responses.
>
> Students writing and publishing their recount of the interview in the format of a newspaper article.

But also some overarching types of social participation could be seen during this time. Among them:

> Students learning how to formulate questions in order to get the information they were aiming for.
>
> Students learning how to take notes of prolonged periods of speech
>
> Students learning how to work in pairs

From the teacher's response to the question exploring the reasons behind making the students play the role of journalists, it is possible to see the general interest behind the type of participation mentioned above:

> *"Yeah, well they, it is important. Again, it is sort of a real situation to put them into, because they need to know how these sort of things would work, because, well who knows.. They may end up on the other side, they may end up being journalist asking these questions. I think it is important these kind of real life situations that they can relate to".*

From the information presented here it is possible to conclude that it is important to conduct both observations and interviews for the research of educational values. It was demonstrated that educational values are highly interrelated in the case of the English classroom analysed. This might represent methodological challenges for their differentiation and systematic research. A possible ways of overcoming this challenge could be assuming that they are fully integrated. Different processes of analysis could then be conducted under this assumption. In coherence with what has been observed here, a productive means of analysis could be to start with the different types of social participation valued, characterizing them with the abilities that they require as well as the developmental goals expressed regarding these types of participation by the teachers in their interviews.

7.2.2 Interpersonal level

More detailed and specific information about the interpersonal processes happening in the classroom was also analysed from the pilot data. A pre-pilot version of the dimensions and elements I was hoping to be able to analyse through the recording of whole class activity are presented in Appendix 2, Table B. This version included: functions of teacher questions, level of feedback, error repair procedures, level of control of scaffolding, type of teacher modelling and learning climate characteristics (including level of dialogue/authoritarianism, sensitiveness and responsiveness, goal orientations and epistemological climate). Some of these dimensions ended up being restructured and many new elements where incorporated based on what the data was showing and later confirmed as relevant dimensions by complementary literature review. A

preliminary coding scheme for the analysis of the interpersonal level is presented in Appendix 2, Table A.

7.2.2.1 Classroom interaction

As explained in the methodology chapter, classroom interaction will be mainly researched through talk. Given the length of the preliminary coding scheme, only one or two codes will be illustrated from each identified theme using whole classroom talk transcripts. Also, given that most codifications need to be understood in the context of ideas displayed in the classroom talk, I will illustrate them using classroom episodes.

In the example extracted from the very beginning of the lesson, presented below in Figure 7.1, it is possible to observe many different themes and codes relevant for self-regulated learning. From the most general to the most specific we can start identifying the characteristics of the classroom episode as a whole to then move to the study of the specific qualities of the individual utterances. *Interactive formats* (whole-class, group based, or one to one) can be identified as giving defining different classroom episodes. In this episode it is possible to observe whole-class interaction as the only interactive format. Certain combinations and the predominance of specific *pedagogic controls* (autocratic, control, negotiated, or anarchic) can help to holistically characterized the level of control exerted by the teacher in the teacher-learner interaction. In the example, students are mostly guided by the teacher while they offer their own ideas, which end up influencing the course of talk in the whole classroom interaction, so it could be characterized as negotiated and controlled interaction, with predominance of the former. During this guidance, the teacher alternates between two types of interactive scripts or *forms of discourse* (interrogatory, expository, evaluative, or dialogic), namely the interrogatory and expository forms. Interrogation is the predominant from the first to the thirteenth turn, with the teacher asking many different questions to guide student thinking.

Figure 7.1 Extract whole classroom episode English classroom

Extract 1. Whole classroom episode

Symbols: T= Teacher; L= Learner; L#= Unknown learner; ()= Unintelligible; ___= Stressed word; (3sec) = Time gap between turns; //= start of interruption/overlap;] = end of interruption/overlap

1. T. (*T is at front of class by board*) **So () What <u>is</u> the learning objective today then? L19, please.** [Teacher question type: *Closed/Display*] [Teacher question function: *guiding to a particular response*] [Teacher question thinking qualities: *Object level/declarative*]
2. L19. **To make purposeful notes.** [Student answer thinking qualities: *Object level/declarative*]
3. T. **<u>Ok</u>, to make purposeful notes. [Feedback level: *Task level*] <u>Right</u>, so, the last lesson, what were we doing in the <u>previous</u> literacy lesson? What were we doing, L22?** [Teacher question type: *Closed/Display*] [Teacher question function: *Elicit recall + Guide to a particular response*] [Teacher question thinking qualities: *Object level/declarative*]
4. L22. **Asking some questions.** [Student answer thinking qualities: *Object level/declarative*]
5. T. **Were we <u>asking</u> some questions?** [Teacher question type: *Closed/Display*] [Teacher question function: *Error repair (teacher indicates, other student fixes)*] [Teacher question thinking qualities: *Meta level/declarative/task dimension*]
6. L#. **No, we were <u>writing down</u> questions.** [Student answer thinking qualities: *Object level/declarative*]
7. T. **<u>Ok</u> so we were writing questions <u>down</u>.** [Feedback level: *Task level*] **What were we writing questions <u>down</u> <u>for</u>, L7?** [Teacher question type: *Closed/Display*] [Teacher question function: *Elicit recall + Guide to a particular response*] [Teacher question thinking qualities: *Object level/declarative*]
8. L7. **For you**. [Student answer thinking qualities: *Object level/declarative*]
9. T. **For <u>me</u>?** [Teacher question type: *Closed/Display*] [Teacher question function: *Error repair (teacher indicates, same student fixes)*] [Teacher question thinking qualities: *Meta level/declarative/task dimension*]
10. L7. **Yeah**. [Student answer thinking qualities: *Object level/declarative*]
11. T. **Was it for <u>me</u>?** [Teacher question type: *Closed/Display*] [Teacher question function: *Error repair (teacher indicates, other student fixes)*] [Teacher question thinking qualities: *Meta level/declarative/task dimension*]
12. L5. **(joking) It was for <u>amusement</u>.** [Student answer thinking qualities: *Object level/declarative*]
13. T. **It might not be <u>me</u>, I might be <u>me</u> but I might be in a character, so, it's for someone, it's for a character, <u>the hero</u>. [Feedback level: *Task level*] Alright, so <u>notes</u>. We're going to be making some <u>notes</u> today on responses to the question that you asked my character, the hero**. [Teacher instruction function: *Explain learning activity*] [Teacher instruction thinking qualities: *Object level/Declarative*]

Extract 1 continuation

1. L5. () **on what we think you would have answered?** [Student question function: Seeking clarification][Student question thinking qualities: *Object level/declarative*]
2. T. **No. You're going to ask me questions, L5, and I am going to answer in character.** [Feedback level: *Task level*] **Ok, so the questions that you created the other day are ones that you will be asking me.** [Teacher instruction function: *Explain learning activity*] [Teacher instruction thinking qualities: *Object level/Declarative*] **There may be questions that come to your mind as we go along that you wanna find out about, more questions, ok? But, we're going to be making a..noting them down, the answers, ok, on a piece of paper.** [Teacher instruction function: *Explain learning activity + Task modulation*] [Teacher instruction thinking qualities: *Meta level/Procedural/Strategies*] **It's really important that you make good notes because you're going to be writing this up next week, you're gonna be doing a recount. So the better your notes, the better your recount, ok?** [Teacher instruction function: *Explain learning activity + Task modulation*] [Teacher instruction thinking qualities: *Meta level/Procedural/Strategies*] **So how do we take good notes?** (*gestures with arms wide open inviting responses from all Ls. One L raises hand*) **Have a minute to discuss it. Lots of different things. How do we take good notes?** (*One L looks at T, T points at her*) **Talk .** [Teacher question type: *Open/Communicative*] [Teacher question function: Encourage explication of thoughts + Encourage metacognitive thinking] [Teacher question thinking qualities: *Meta level/procedural/strategies*]

Whole episode codes: [Interactive format: *Whole class*] [Pedagogic control: *Negotiated-Controlled*]. Semi episodic codes: [Discourse forms: *Interrogatory* (turn 1 to 13), *Expository* (turn 14 to 15)] [Teacher scaffolding: *Whole class based* (turn 3 to 13)].

The different turns of the teacher and students can also be characterized according to the qualities of the instructions, questions, comments and answers contained in them. The different *questions* formulated could be categorized according to their *form* (open/closed), communicative *purpose* (display/communication), pedagogic *function* (e.g. checking understanding, encourage explication of thoughts, seeking clarification, and so forth) and the *qualities of thinking* (e.g. object/meta level, procedural/declarative/conditional) they reflect about who formulates them. Overall, most of the teacher questions present in the example are framed as part of a process of instructional *scaffolding* to leverage students' understanding (contingent/non-contingent/not-undertaken, and whole-class/group/individual based). This scaffolding has two phases, the monitoring of students' understandings through questions with teacher support to overcome some misunderstandings, both through reflective (meta level) questions (turn 5, 9 and 11) and instruction regarding some information (turn 13). Towards the end of the episode, following turn 14, the teacher changes to an expository form where he offers instructions to inform the students about what is going to happen in the lesson and how they should approach the activities within it.

Teacher instructions can be found in turns 13 and 15. These usually have one intention or more or instruction functions (e.g. prompting specific answers, modulating a task, explaining a learning activity, modelling cognitive procedures, and so on). In the case of those found in the above sample, explaining a learning activity was the predominant function. The same functions can be delivered through very different means, and this example is no exception. Instructions with the function of explaining a learning activity were sometimes delivered through utterances reflecting a declarative object level and some other times through utterances reflecting a procedural meta-level:

"*Ok, so the questions that you created the other day are ones that you will be asking me*". [Declarative object level]

"*There may be questions that come to your mind as we go along that you wanna find out about, more questions, ok? But, we're going to be making a..noting them down, the answers, ok, on a piece of paper*". [Procedural meta-level of strategies]

When on a meta level, thinking could be characterized further according to the type of thinking dimension the speaker focuses on (task, person, strategy or environment) or the type of thinking process they are reflecting (planning, monitoring, controlling, or evaluating). In teacher and whole-classroom talk it is more common to find the former, but if talk becomes the medium of the learning task (such as a discussion about a particular idea with a particular student or between particular students) sometimes it is possible to observe the latter instead, especially from students. An example of a type of thinking process could be illustrated when in the middle

of a talk with the teacher a Chilean student says, "*I got confused*" [declarative, evaluative meta-level].

As could be seen from the example above, student's answers and comments can also be characterized according to their thinking qualities (thinking dimension, process, level and knowledge type). This could be a good way of researching the general level of self-regulated learning in a classroom, because the use of metacognitive knowledge and metacognitive processes are at the core of this way of learning. In the transcript example, it is possible to identify many students' answers. They are mainly reflecting an object level of thinking and a declarative type of knowledge in this whole-class talk. It is possible to find more meta-level talk when examining what students' talk about when discussing ideas or ways of doing things with peers:

Figure 7.2 Examples of student-student classroom talk

Extract 2 Group discussion

A group of children are talking about how to take good notes.

1. L20. () Put all the main things in, like 'Cow jump over moon'…
2. L28. But if like you think 'Molly went to the shops' … 'Molly went to the shops', to make it shorter you put 'Molly to shops'.
3. L20. No, 'Molly goes to shops'.
4. L28. Yeah, 'Molly goes to shops'.
5. L20. 'Molly goes to shops.'
6. L28. But if it was 'Cow jump over moon' ()
7. L27. (*interrupting*) Where's my apple? Where's my apple?
8. *L#A comes over from other table and interrupts briefly looking for pencil*.
9. T. Five…Four…Three…Two..Ok

In the example above, it is possible to observe a meta-level in the students' thinking during turns two, three and four. During turn two, L28 demonstrates that he is consciously applying some procedural knowledge, in this case about a writing strategy (note taking), in order to transform a sentence into a note [procedural meta-level, strategy]. Then, L20 from his thinking about L28's answer offers another possible solution during turn three [procedural meta-level (about) strategy, (applying) monitor/control] with which L28 ends up agreeing, therefore changing his previous thought [procedural meta-level (about) task, (applying) evaluation/control].

Apart from the qualities of thinking, students' answers, comments and questions could also have a function within the classroom interaction. As it was possible to see previously in Extract 1, at the level of the whole-class, student questions could have the function of seeking clarification from the teacher (turn 14). On the other hand, at the level of peer interaction, student's comments could have other sorts of functions that seem to emerge when power differences

(such as the teacher/student ones) disappear. For example, in Extract 2, during turn three, when L20 challenges L28's answer, there seems to be a function of encouraging metacognitive thinking. It still remains to develop a list of codes for the analysis of peer interactions, but here it is possible to see that, similar to the preliminary list of codes developed for whole-classroom context, it might include characterizations of questions, comments, instructions and answers at a specific level and more episodic or procedural elements, such as discourse forms (e.g. cumulative, exploratory, disputational; see Appendix 4 for a summary of these forms extracted from Mercer and Littleton, 2007). Accordingly, for example, Extract 2 could be depicted as an exploratory peer episode.

7.2.2.2 Classroom motivational structure

The different forms of discourse used by the students may also reflect the *learning motivational climate* of the classroom. They seem to show the epistemology underlying the peer interactive activity. For example, the exploration above may reflect an understanding of knowledge as fluid (low certainty), as illustrated by the smooth change of opinions. It could also been said that knowledge may be seen as contextual (low simplicity), as may be illustrated by the potential use of "*But, if it was Cow jump over moon*" during turn number six, to communicate a different note taking form when using an alternative phrase. On the other hand the process of knowing may be seen as a joint construction (self as source) but a bit dualistic (no justification), as the low level of argument for the change of one idea may indicate, with one option being better than the other without further explanation. The understanding of epistemology as something interpersonal fits well with the characterization of a learning climate promoting SRL. Nevertheless, as self-regulation is ultimately an individual activity students' personal epistemologies may also be characterized through following the talk of particular students throughout a series of lessons or through interviews. This will be expanded upon in the section about personal level analysis.

Classroom epistemologies can also be observed through instruction. Epistemologies promoted through the teachers' speech in learning activities and evaluation shown to be present throughout most of what was said or happening in both classrooms analysed. Figure 3 on the following page presents some examples of the codification of enacted epistemologies through the analysis of classroom descriptions.

Figure 7.3 Examples of enacted epistemoplogies in the classroom – whole classroom level

Description n.1 (Chilean Classroom)

20 sec-1.49 min *Teacher presents the objective of the lesson and asks the students if they remember some content they covered the past year which is relevant for what they will learn in this lesson: "What are geometrical figures?" A student offers an answer, but not being happy with it, the teacher asks someone else and, again, not being happy with the contributions of this second student, she interrupts the student and repeats the original question (students are confusing geometrical figures -cube- with geometrical shapes- square). It looks like a game where the students try to guess what the teacher is thinking about.*

Certainty of knowledge, *as fixed truth*. **Simplicity of knowledge**, *as fact based*. **Source of knowledge**, *as received, coming from the teacher authority*. **Justification of knowing**, *as dualistic*.

Description n.2 (English Classroom)

4.54-5.30 min: *The teacher summarizes all the students' contributions, adds more information to them, and offers further rationale for when and why one would take notes, also adding that it is a personal process, varying from person to person.*

Source of knowledge *as jointly constructed, summarized and improved by the teacher + as self based;* **Simplicity of knowledge** *as interrelated, relative and contextual;* **Certainty of knowledge** *as Fluid.*

Goal orientations are also part of the learning motivation climate to be explored in this project. They refer to the reasons promoted and enacted for the learners' engagement with a task and the evaluation of their performance in a task. Therefore, unlike classroom epistemologies, they are not inferable at all times and may only be inferred when engagement is promoted and evaluations are expressed. Taking as an example the Extract 2, showing the discussion of two students (in Figure 2 presented previously in this chapter), it is possible to observe how goal orientations can be inferred from peer interactions.

The interaction between L20 and L28 shows how, in the interactive system, L20 collaborates with L28 in his reasoning, shifting from his proposed exemplary phrase to that of L28between turns one and two. L20 collaborates with L28 offering an alternative expression. They have a little discussion and resolution about what example would be more effective note taking between turn two and five, where L28 accepts L20's contribution, showing that there is an orientation towards the mastery of the learning objective in both students. In the case of L20, this can be seen where he swaps his first phrase to that of the other student in order to think about it together. In the case of L28, this orientation can be seen in his willingness to take L20's contribution and accept it as a possible better option. Here collaboration is more important than showing a level of performance to the other.

Figure 7.4 Examples of Mastery/Performance Orientation in the classroom – whole classroom level

Description 3 (Chilean Classroom)

1:07-2:23 min. **Evaluative criteria**. *Teacher asks questions of students, and if they are not able to provide the correct answer, she looks for another student to answer the question. When there is a mistake, the teacher does not correct or help the student, instead she seeks someone else who may say the correct answer, and if correct then she repeats it, communicating it as valid answer.* [**Performance orientation].**

Description .4 (English Classroom 1)

1.30 - 1.44 min. **Student engagement**. *Teacher motivates the students to engage in good note taking in order to be able to make a good recount later on. The focus of the motivator is on the task/learning rather than competition. It also communicates the importance of strategy for learning: "It is really important that you make good note because we are gonna be writing this up next week, we are gonna be doing a recount. So, the better your notes, the better your recount".* [**Mastery orientation promotion]**

Description 5 (English Classroom 2)

23.20-23.45 min. **Student engagement and evaluative criteria.** *Teacher asks students to talk to each other to work out how a mixed number could be transformed into an improper fraction. Some students display their personal whiteboards with the written result even before they talk to other students. And some other students talk for 5 to 10 seconds before they display their whiteboards to the teacher. Meanwhile the teacher stays by the whiteboard looking at the children as if she was waiting for them to show their results and gives feedback from the side of the whiteboard about the accuracy of the student's attempts by saying out loud "very good" student by student.* **[Performance orientation].**

7.2.2.3 Activity settings

Interactions may be informed by the types of activity setting in which they occur. Originally I was interested in including both the types of learning resources and the activities carried out in the lesson as educational tools reflecting the characteristic of the culture. However, throughout the piloting process it became evident to me that more than the applied materials or physical resources used in each lesson analysed, that which reflected the cultural differences in the specific observed classrooms were the type of activities carried out with these materials. The same sort of observed materials (i.e. geometrical figures and vignette about the maiden voyage of the Titanic) could have been used in many different ways in the teaching-learning process. I will therefore consider only the types of activity settings in this research project, understanding as an activity setting any sort of defined activity design following particular learning processes and goals. This consideration of processes and purposes might reflect some community level aspects, such as social norms (processes) and values (purposes) enacted in the classroom setting, but will also provide the boundaries of the learning action and inter-actions. Within each classroom analysed between three to four activity settings could be identified. An example of two successive activity setting can be seen in Figure 5 (see Appendix 5 for a more detailed account of the totality of activity settings observed in the two classrooms analysed).

Figure 7.5 Examples of activity settings in the classroom

Chilean lesson first two activity settings

- Whole class introduction to the learning objective of the lesson (to identify geometrical figures, their parts and names) followed by the instruction of relevant content by the teacher delivered through repetitive exposition as well as teacher-student questions and answers.

- Group activity where students were asked to apply what was taught in the above activity setting. Students examine different geometrical figures the teacher brought with her and were asked to identify their names and parts. No instructions about the group work method were given so most students worked individually sharing occasionally with other peers. Teacher visited each group during the activity. When in each group the teacher took the role of instructor.

Overall, activity settings seem to be important for understanding the contexts in which classroom interactions take place. The contrasting examples of the analysed lessons demonstrate the usefulness of considering these activity boundaries in the analysis on interaction, because activities, understood as a material tool, can have indirect influences on psychological processes given the demands that they put on them (Kozulin, 1998). They seem to contribute to the limitation of teacher-student and student-student interaction as they facilitate some learning behaviours and processes over others. Therefore, they will be included as contextual information of codified classroom interpersonal interactions.

7.2.3 Individual level of analysis

7.2.3.1 Students' espoused motivational beliefs

A group interview was conducted with two students. The aim of the interview was to test the appropriateness of exploring both epistemological beliefs and goal orientations in students aged eight to nine years old. Key questions regarding personal epistemologies were: Where do you think knowledge comes from? What do we mean by knowing something? And, what is knowledge? The students understood the question very well and were very articulate in their answers. The only new question from this interview that required piloting was the first one of these three. Students' answers to this question and follow up questions can be found in Figure 6 on the following page.

Figure 7.6 Example of students' espoused epistemological beliefs.

Me: Where do you think knowledge comes from?

L1: your brain, and books, and on-line, because you can find knowledge researching, and you can ask certain people to help you and find knowledge

Me: what kind of people?

L1: Teachers and specialist of what type of knowledge you want to know, and parents, because if they help you and tell you, if they don't know they can tell you something to do to let you find knowledge

Me: What about you? (*referring to the other student*)

L2 Things that can help you research things. You can get people like specialists who know stuff, like scientists, yeah like specialists.

Me: Ok. And when you are learning in the classroom, where does knowledge come from?

L1: Well, Mr. X (*teacher*), he gets knowledge from a computer and then puts it in a Power Point to help us learn knowledge.

Me: And you?

L2: The same, but maybe Mr. X does not get it online, maybe he gets it from his teacher when he was at school, and then his teacher got it from his other teacher when he was at school, and then it goes on and on

From the interview above it is possible to say that the question added to those of Hargreaves and Kershner (2013, see chapter 3, section 5.3.2) is able to prompt the beliefs that children hold about the source of knowledge. In this case, the students seem to see knowledge as coming more from outside themselves (e.g. from the teacher, internet, their parents, specialists) than from within themselves. Nevertheless, that some elements of knowledge are understood as coming from themselves and are constructed with other people can be seen in some of the comments (e.g. "*your brain*", "*we do know some knowledge*", and "*maybe [classmates] have been researching and they pass it on*").

Goal orientations were also explored at the level of students. Interview questions were especially created for this purpose. They included: *What motivates you more, to demonstrate your abilities to other people, like the teacher or your classmates, or to yourself? Why?; How much do you like competing with others? Why?; How much do you like challenging yourself? Why?* I also gave a case example: *There are two people and you need to decide which one is more successful. One of them has only abilities, great abilities, and has become successful. The other one doesn't have as many abilities, but has put in a lot of effort and has also become successful. Which one is more successful?* The whole interview can be seen in Appendix 7, here I will only provide some illustrative examples.

Students demonstrated that they understood the questions and were very articulate in their answers. In the case of Student 1 it was possible to see mostly a mastery-approach orientation:

"*I think I probably [prefer] demonstrating abilities to myself, because It get a bit shy when I have to demonstrate it to other people. And I feel free and ok when I just have to demonstrate abilities to myself*". She also showed some elements of performance-avoidance: "*Yeah, I don't actually like to say things to other people, because what I might actually say might be something wrong and they might laugh at me and call me silly or something*".

Student 2 showed more signs of performance orientation (both of approach and avoidance): "*Sometimes. Sometimes I feel fine. Sometimes, if I feel like something is good and there is something I would like to show people, I would like to do that as well. But sometimes I don't feel so safe doing that in front of people, because I feel very shy, my heart goes boom boom*". But she also showed some elements of mastery-approach orientation when confronted to the case presented to them: "*The person that does not have as much ability* [is more successful]*. Because it still means that they have tried their best. It does not matter how it looks or anything, just as long as they are being serious and have tried their best*".

7.2.3.2 Teachers' personal beliefs

From the individual interviews conducted with the teachers it was also possible to see some elements of personal beliefs of the teacher. For example, when the teacher was asked about what type of approach he takes each time he goes to help a group of children or a specific student he answered:

"*If they are working and I am just glancing at their work, it would be sort of more specific to their own need, so, 'uh..what is missing there?', or you know, just get them to re-check their work and or just say they could have a look and see whether they have made a mistake. And, you know, if they have done it wrong then I would say, 'What could, what do you think happened there?' And it would be like a full stop or something. And then if I say, and they have a look, they would say.. 'Oh, yeah'*.

This may show both a valuing of self-direction and an understanding of self and joint activity as a source of knowledge. The teacher shows a valuing of self-direction by giving students the chance to correct themselves. Moreover, both him and the children are seen here as a source of knowledge; they construct knowledge together. Epistemological beliefs like this were frequently found in the interviews. Some reflections of the teacher about his own practices may also reflect a belief in knowledge as complex (interrelated) and uncertain (fluid): "*I don't know if they, if that was difficult for them because they didn't actually write the questions down, you know, so maybe that is something I need to go away and think about the next time I do it*".

Nevertheless, as can be seen through these examples, the information gathered through the interviews centred on the teacher's pedagogical decisions only allows for inference of the teacher's espoused epistemological beliefs and personal values. This is coherent since the interview had as a main purpose understanding teacher practices in order to better interpret the educational and cultural values present in the classroom. Other more direct questions about

their personal beliefs about knowledge and knowing are necessary. Other types of questions and methods will need to be incorporated in order to do this (see chapter 3, section 5.3.2). More direct questions addressing personal beliefs will also need to be formulated in order to access the teacher's espoused personal values (see Chapter 2, Section 5.5). A full transcription of the interview and other analysis of the teachers' answer can be found in Appendix 8.

7.2.3.3 Students' SRL

Students' SRL will be measured through a cube assembly task for which an observation scale has been developed by Dermitzaki et al. (2009). The task was applied to ten students in order to: i) prove its appropriateness in terms of difficulty for eight to nine year olds (the authors applied it to seven to eight year olds) and; ii) test the level to which teachers could differentiate SRL levels using the description provided. A detail of task challenge, SRL, sex and age per student is presented in Table 3.

From the information in the table, is possible to observe that the task was appropriate for the majority of the students, but not for a couple of them. Levels of challenge were not associated with age, which makes me conclude that the task is generally appropriate for 8 to 9 years old, but it would benefit from raising the level of difficulty for those students who carry it out without much difficulty. This would ensure that all research students have the chance to show their levels of SRL to their maximum potential. Moreover, from this table it is possible to observe how the level of SRL as estimated by the teachers is similar to my estimation for low SRL, but differ, to some extent, for medium and high SRL. This suggest that some improvements to the description provided to teachers about what a self-regulated learner does need to be made for them to better distinguish between high and medium SRL (see Appendix 9). One option would be to change from a distinction between levels to one based on frequency with which SRL is observed in each student; this might make the teachers think more about each student before they categorize them and get less confused with achievement, which is typically expressed in levels.

Table 7.3 Level of adequacy of cube assembly task for 8 to 9 years old

Student	Level of challenge of task	SRL according to teacher	SRL according to researcher	Age
1	adequately challenging	high	high	9 years, 7 months
2	adequately challenging	low-medium	low	8 years, 11 months
3	adequately challenging	high	medium	9 years, 2 months
4	adequately challenging	low	low	9 years, 0 months
5	adequately challenging	High	medium	9 years, 5 month
6	adequately challenging	medium	medium	9 years, 1 month
7	semi-challenging	medium	high	9 years, 0 months
8	semi-challenging	high	high	9 years, 3 months
9	not challenging enough	high	high	9 years, 6 months
10	not challenging enough	medium	high	8 years, 10 months

7.3 Conclusions from the pilot study

Several implications for the research design and specific methods came as a result of the conducted pilot study. In terms of the overall design, as a product of the pilot study many sampling criterions were decided. It was decided that the study was going to focus on primary literacy lessons instead of literacy and mathematics or just mathematic lessons. This decision was due to the amount of culturally relevant elements found present in the observed literacy lessons as opposed to the mathematics ones which focused primarily on content matters. By focusing on literacy more culturally relevant activities and socialization like processes seemed likely to be reflected on the analysed classroom data. Also, the decision of researching continuous lessons instead of non continuous lessons was reached given the apparent advantage that continuous data provided for the interpretations of teachers' and students' observed behaviour and utterances. Finally, the possibility of including two classrooms per school instead of just one was considered given the general classroom culture differences that the two observed year 4 English classrooms seemed to have in the pilot school.

The need to include different teacher's and students' interviews seemed relevant after conducting the pilot study. Originally only classroom observation followed by 10 minutes teachers' interviews for the clarification of teacher decisions and actions intentionality was piloted. Even though these interviews seemed appropriate, after observing some of the classroom activity video-recorded it became apparent that the teacher's and students' personal beliefs I originally intend to consider only as enacted, required to also be studied as espoused personal beliefs at a more private level. The consideration of them at the enacted level would have left me, in the case of the students, only with an understanding of the beliefs as afforded within classrooms without allowing me to actually explore the effect that cultural processes and meanings might have on the students' personal mental processes, which I was interested on researching. In the case of teachers, not including espoused personal beliefs as researched at a personal level would have not allowed the differentiation between the effect of societal and school community levels v. the effect that teachers' personal characteristics on classroom cultures. The inclusion of the students' group interview present in the pilot study was a later addition which I had time to pilot before the piloting finished and which proved to be fruitful.

In terms of research methods, in general all the different techniques applied for the collection of data were rather successful. Whole classroom video data proved to be the an appropriate way for the systematic research of teacher-student interactions and enacted teacher beliefs, whereas teacher's interviews after each of these recorded lesson proved to be relevant for the interpretation of the observed events considering the intended meanings of the teacher actions (which unfortunately could not be added to the final study). The video of target students' learning activities also proved to be appropriate for the research of student-student interactions

and their enacted beliefs (this aspect of the study was abandoned after not finding much interactions for learning between students in the participating Chileans classroom). Some technical difficulties regarding the audio of these videos were possible to detect and alternative ways of better accessing students' talk in very loud classroom environments was possible to try with success. Students' interviews were successfully piloted, with both questions and the social configurations of the interview (group rather that individual interview) proving to be adequate for the access of students' beliefs. A task for the assessment of self-regulated learning capacities was also successfully piloted, providing insights of the need of slightly increasing the difficulty of some of its cube assembly tasks for students with higher assembly fluidity, in order to provide higher challenge allowing the better expression of self-regulation processes.

8. Appendix 8 – Supporting materials for codification of children

Coders of interviews had access to the following more detail explanation of the different motives children might express.

Motive	DEFINITION
Learning	
Personal learning (self-referenced)	Student motivated towards personal improvement. Invests time and effort specifically **for improvement and understanding.** Motivation is not linked to any social obligations, if there is a motivation of performance, this seems to be more linked to a learning interest rather than an interest to be show one is good or better than others.
Personal learning (socially referenced)	Student likes **comparing his/her current performance with previous performances** in order to improve. //Student displays or compares his/her abilities against others (applies an external point of reference) in order to **promote his/her own learning.**
Personal learning (task referenced)	In order to assess his/her own competence, student sees the successful **completion of the task as the point of reference** to evaluate his capacities.
Intrinsic value of effort	Student expresses a value of effort as an **important characteristic of a person in general**. They do not relate it to learning specifically. This does not refer simply to when students say they put effort into things and then do not explain why (see code 5b), but when in their justification of their answers they refer (or a allow to easily infer) an understating of effort as a value on itself.
Value of content	Student motivated to put effort by the activity he or she gets involved in, **because of its material format**
Value of activity	Student motivated to put effort by the activity he or she gets involved in, **because of its social format**
Helping others to learn	
Promotion of others' learning	Student displays or compares his/her abilities against others (applies an external point of reference) in order to **promote the learning of others.**
Promoting others' improvement	Student motivated by the enjoyment of putting effort in order to **help others to improve**
Performing higher	
Prove to be better than others (academics)	Student compares or displays his/her abilities to others (applies an external point of reference) in order to **maintain or increase his/her personal status, in the *academic*** dimension
Prove to be better than others (social)	Student compares or displays his/her abilities to others (applies an external point of reference) in order to **maintain or increase his/her personal status, in the *social*** dimension (being cool, have friends, people liking him/her, etc)
Avoid being worse than others (academics)	Student does not apply an external point of reference. He/she does this in order **not to lower his/her personal status in the *academic* dimension** (regardless of his/her current academic level) (being less able, getting an answer wrong when others get it right, not showing ability, etc).
Avoid being worse than others (social)	Student does not apply an external point of reference. He/she does this in order **not to loose face in the social sphere**. Differs from academic sphere in the sense that students refer to social reasons **(being cool, have friends, people liking him/her, etc)** instead of performance reasons (being able, getting an answer right, showing ability, etc).
Meeting others' expectations	Student is motivated by **external pressure** that seem to control or regulate him/her from outside, such as sense of moral duty, a desire to be seen as a good performer by others, obtain a reward, etc. Note: a student might have a desire to perform well for reasons different than from the desire to show good performance to others

Motive	DEFINITION
Feeling able	
Feeling able	Student explicitly expresses ideas that with none or very little inference allow to think he/she is motivated to put effort because he/she wants to **promote a good self-esteem** or just **feel good about him/her self.**
Avoiding feeling unable	Student prefers to avoid effort because he or she **avoids to feel unable**. Student may justify this avoidance attributing possible failure due to contextual OR internal factors. // Student does not engage in social comparisons to **avoid feeling worthless**. This generally reflects a fear of the student originated from his/her usual bad performance.
Relating to others	
Promoting supportive relationships, avoiding embarrassing others	Student compares or displays his/her abilities to others (applies an external point of reference) in order to **take part and share with others, having fun and belonging**. This could be the case when students like showing abilities to family or friends and does not refer to any competitive, neither learning, reason for it. OR When student demonstrates his/her abilities to others being **concern about protecting relationships** with others by avoiding embarrassing them.
Protecting relationships from conflict	Student does not like engaging in social comparisons and the main motivation for this is to **avoid conflicts with peers** and/or **avoid making others embarrassed**.